TECHNOLOGY

approach

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Our Product is safety, our process is education, and our profit is measured in the preservation of lives and equipment.

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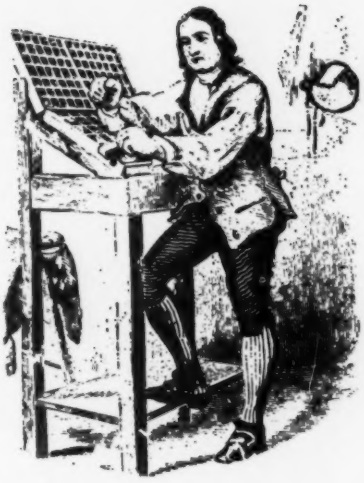


LETTERS

Filing to an Alternate In Jet Aircraft

Sir:

OpNav instructions and common sense say that a jet aircraft shall not penetrate unless the weather is at least up to minimums. However, when shooting an approach to radar minimums, there is always the possibility that a missed approach may be necessary due to communications, lost target, rain, . . . The usual missed approach procedure for radar approaches is to proceed to some facility serving the airport such as tacan, ADF, etc. Since radar minimums, the problem of filing to an alternate becomes paramount.

It takes time to set up the aircraft before it is safe to key the mike and say the proposed route, altitude, . . . Time is consumed by the center in issuing the clearance, particularly if the route proposed is through a high density area. The latter means a standard instrument departure will be issued by center and these are not always in the direction desired. Since it is not required to have fuel for two approaches (destination and alternate), jets are usually down to fuel available for a climb on course with a penetration on arrival at the alternate, at the time of the missed approach. One alternative is to declare an emergency and go. In this situation, center will probably not be able to provide proper separation.

A solution to this problem is to file to the alternate before penetrating, stating that a climb on course or nearly so, will be necessary, in the event of a missed approach. Center can then take a few minutes and work out a reasonable route. Given enough time, approach control will have the clearance ready before the penetration. The departure can then be effected with no waste of fuel at low altitude.

J. E. FLATLEY, LT, USN
VT-22, NAAS Kingsville

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Aviation Safety Center.

Cut APPROACH In

Sir:

"Has information in APPROACH magazine ever helped . . .?" In more ways than you may realize.

At the request of ComNavAirPac and the Fleet's expressed need for Quality training, a two-week Quality Control Management Course was launched. In order to provide text material exemplifying Quality Control thinking, excerpts from APPROACH have been used extensively.

Such articles as "Kick the Tires or Overhaul?" by LCDR D. L. Briggs . . . April 1960, "Inspection Aims" . . . September 1960; "Maintenance Guidelines," ComFAir Whidbey . . . October 1960; "Reliability" . . . November 1960, to mention a few, have been reproduced for distribution to each class participant.

We have found these articles to be of incalculable value in promoting the Quality Control idea. Our score at the end of the 9th class is 5 officers and 127 men representing 43 activities. You can see why, with this kind of training volume, we'd like to see more on Quality Control in future issues of APPROACH.

F. L. BRADY, JR.,
Quality Control Officer, O&R

NAS Alameda

● **April and May issues broke the ice—more on this subject is scheduled.**

Quality Control Info Helpful

Sir:

I want to congratulate you on series of articles on "Quality Control" that appeared in the April 1961 issue. Each article was very well done. I know they have been helpful to me. I am sure they have been to others also.

HARLEY D. KYSOR
President, Aeronautical Consultants & Associates, Inc.

N.Y.C.

Wrong Type or Grade of Fuel

Sir:

The following recent communication from the FAA is quoted for the information and guidance of all concerned:

"There have been several incidents reported recently of aircraft that were or nearly were serviced with the wrong type or grade of fuel.

"Two supplemental air carrier DC-4 aircraft were refueled with JP-4 fuel at a military base. One of the aircraft aborted takeoff due to heavy detonation and loss of power on all four engines. The other was flagged down immediately after starting. An Air Force *Convair* which had been refueled with JP-4 made a crash landing shortly after takeoff. Fortunately there were no casualties.

"Investigation disclosed that a 4000-gallon JP-4 fuel truck had been temporarily converted and placarded to carry 115/130 octane fuel. The truck was inadvertently filled with JP-4 fuel.

"During another incident, an FAA inspector observed a *Viscount* about to be refueled with 115/145 octane gasoline. The station manager was advised and a serious error prevented.

"It has also been reported that a scheduled air carrier had almost refueled a DC-7 with 100 octane gasoline but noted it in time to rectify the mistake.

"Efforts have been made in the past to insure proper servicing by color coding the gasoline, placarding of fuel trucks and tanks, and adequate training and supervision of the personnel who are responsi-

ble for the acceptance and storage of fuel and the refueling of aircraft.

"The addition of kerosene and the JP fuels for turbine-powered aircraft has further complicated this problem and could result in more serious consequence."

R. W. BLAKE
Senior Operations Engineer, FAA

Effect of Mixing Fuels

Sir:

In the March 1961 issue of APPROACH, there appeared a letter (p 2, 3) which discussed an occasion when AvGas was contaminated with JP-5 and dispensed to some aircraft. In the interest of perhaps shedding a little additional light on this, I would like to present the following.

The allowable limits for specific gravity for AvGas are from .685 to .739 and for JP-5 from .788 to .845. From this, it follows that a mixture of AvGas/JP-5 could contain as much as 52.43% of JP-5 and still fall within the allowable specific gravity limits for AvGas.

Assuming that the refueler driver topped-off the refueler truck with the addition of 775 gallons of JP-5, this would have resulted in a mixture that was 25.83% JP-5 and could have had a specific gravity any place between .712 and .766.

After topping-off the refueler truck twice more with 517 and 195 gallons of AvGas respectively, the resulting mixture would contain about 19.94% JP-5 and could have had a specific gravity any place between .706 and .760. From this it may be seen that specific gravity by itself is no positive indication of the amount of cross produce contamination that may be present in AvGas/JP-5 mixtures.

To progress further using the APPROACH gallonage data and assuming the refueler truck was completely topped-off each time, the 1st aircraft would have received a fuel mixture containing about 25.83% JP-5, the 2nd aircraft a mixture containing about 21.33% JP-5, and the 3rd 19.94% JP-5. While it is impossible to predict what the actual octane ratings of these fuel mixtures may have been, in a random test elsewhere, it was determined that the addition of 10% JP-5 to AvGas grade 115/145 resulted in an octane rating of 96/113. This rating could have been substantially lower than this if the JP-5 selected had contained the maximum sulfur allowed by the P-5 specification.

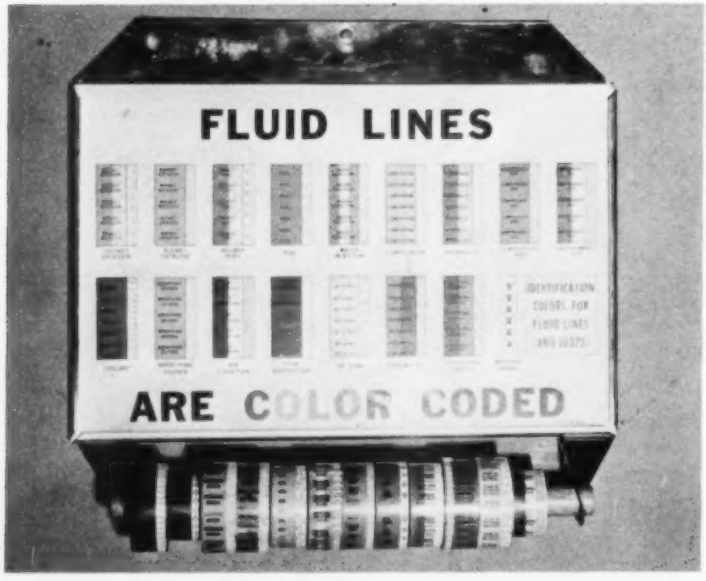
It is fortunate that in this case, no accidents resulted. It appears that the measures instituted by this command should remove a large part of the hazards, but the point that the end user also has a large responsibility should be stressed.

D. E. NASH, LCDR
BuWeps, RAPP-412

Cut Us In!

Has information in any Safety Center publication ever helped you prevent an accident—prevent an injury — or better handle an emergency?

If so, and you have not reported it to NASC already, it is particularly important that you do so. This information is vital to both editorial direction and fiscal support of our safety education program.



Tape Dispenser — In order to promote the proper use of fluid line identification tape, this squadron had need for a readily available identification tape dispenser. This need was solved by manufacturing a dispenser designed by COFFMAN, V. G., ADC.

This dispenser is easily fabricated in any squadron's Air Frames Shop. The poster "Identification Colors for Fluid Lines (AND 10375)" is available from the Naval Aviation Safety Center. One of these dispensers is conspicuously located in each shop and in the Line Shack. — J. F. DOHERTY, CO, VU-3 — *NAAS Brown Field, Chula Vista, Calif.*

Aircraft Loading Safety Inspector

Sir:

During the outloading phase for SHANGRI-LA'S recent deployment, while hoisting an AD-5 aircraft from the pier to the flight deck, an extension cable being used by the crane operator caused a near accident. The eye splice whipping began to unravel and popping noises were heard indicating incipient cable failure. The aircraft was lowered back to the pier in order to inspect the cable. Due to its badly deteriorated appearance, the squadron loading officer refused to allow its continued use.

To prevent possible recurrence of such incidents it is recommended that a technically qualified inspector be present at all future aircraft loading operations. It is suggested that he be qualified to determine the size and strength of cables required for the various gross weights, the stress placed on a cable each time a load is lifted, and the accumulated strain over a period

of time, and to ensure proper and secure attachment of hoisting slings to all heavy gear being loaded.

It is considered that neither ship nor Air Group personnel are qualified to perform this function. The presence of a specialist in this field should greatly enhance the safety of future loading operations.

F. B. GILKESON
CO USS SHANGRI-LA

T. S. Attitudes All-Important

Sir:

I feel that one very important item was left unsaid in the "Transient Service" article in the February issue of APPROACH. That is on the attitude of *interest*.

If interest in the problems of a transient pilot is exhibited by station personnel, the quality of service rendered will be limited only by the facilities available—unlimited facilities will never replace one ounce of genuine *Interest*.

V. F. FORSBERG, LCDR
BuWeps Fleet Readiness Rep.

Wright-Patterson AFB, Ohio

NEW SKYHAWK — VA-125 weekly inspections sure are strict! Here Commander Durand, CO of the Moffett-based Replacement Air Group (RAG) squadron, is aided in his scrutiny of a *Skyhawk* by the hawk eyes of "Rough Raider," the squadron mascot. "Rough Raider's" inspection of this model aircraft is particularly appropriate because he is a *Skyhawk* himself, a newly discovered species of hawk so named by VA-125. His proposed scientific name, "*falco skyhawkus durandi*," has been forwarded, through official channels of course, to the Smithsonian Institute for approval.

Cheerful Service

Sir:

Here are a few facts regarding Transient Service at Cherry Point:

A crew averaging 12 men serviced over 7000 aircraft this past year. Pumped one and one-half million gallons of fuel averaging about 120,000 gallons monthly. Transient service is never closed—Open 24 hours a day, 365 days a year.

To our knowledge no accident was caused by our service. Of total aircraft received this year about 900 repairs of all sorts were effected. Aircraft serviced ranged from P5M flying boats, the F4H, several blimps, Air Force aircraft from KC-135s to F-105s, to all kinds of helicopters and even PT boats. We have provided service to Navy, Coast Guard, Air Force, Army and foreign aircraft and civilian airlines.

Our motto: "Free Cheerful Service" (with emphasis on *cheerful*).

Rain, Shine, Snow, Hot or Cold, Nite or Day we are here to help in every way.

ROBERT J. AHEARN, SSGT,
SOES, MCAS

Cherry Point, N. C.

Maintaining VFR During Practice GCA

Sir:

Your item carried on page 48 of March 1961 issue of APPROACH is heartily endorsed by this command. However, it is not sufficient to merely "remain clear of scud or fog" when making practice GCAs on a VFR flight. You must maintain 500 feet beneath, 1000 feet above and 2000 feet horizontally from clouds when above 700 feet.

At NAS Patuxent, a 2000 feet ceiling is required in order to make VFR practice GCAs. The local pattern altitude is 1500 feet.

L. G. NORTON
RATCC 13

NAS Patuxent River, Md.

Ground Zero

Sir:

Air Transport Squadron TWENTY-TWO is the recipient of a MATS Outstanding Unit Award for its notable ground safety record during calendar year 1960.

During the award period, VR-22 through a positive, effective program reduced its ground accident rate index from 2.54 in 1959 to ZERO in 1960.

This award reflects a dedicated effort by the officers and men of VR-22 in the safety program and represents another highlight in a long list of notable achievements by this squadron.

J. F. MENCH, LCDR

NAS, Norfolk, Va.

Want New Design

Sir:

Flight control linkages and any linkages in today's aircraft need a new design approach—for years the bolt and nut combination has been used for this important function. Far too many accidents have been attributed to this combination. The nut and bolt combination has caused and continues to cause too many accidents. The use of lockwire and/or locknuts still is not the ultimate answer since they can be misused or deleted by maintenance personnel. There must be a better way!!! — Let's hear from you inventors.

CONVAIR DESIGNERS

PLANE GUARD DESTROYER AND HELICOPTER RESCUE PROBLEMS

In its continuing concern with plane guard destroyer and helicopter rescue problems, APPROACH presents a general discussion of some rescue attempts—both successful and unsuccessful—which took place during 1960.

IMMEDIATELY after takeoff for plane guard duty, an HSS-1 lost power at 200 feet in the delta pattern. With power insufficient to permit landing on the flight deck, the aircraft ditched 30 yards off the port bow. As it settled into the water, it rolled to the right, breaking off two of the main rotor blades. Seconds after the chopper began to sink below the surface of the water, all three occupants escaped and were picked up uninjured by plane guard destroyer.

In his report, the copilot praised the destroyer's performance of the rescue maneuvers.

"The destroyer made a perfect approach to our position and threw lines to us," he stated. "Hold-

ing on to the lines, the crewman and I drifted to the side of the ship. I told him to go up the cargo net first. He started up the net but had difficulty as the ship was now drifting out of the wind and commenced to roll badly in the troughs. The destroyer was unable to maneuver for fear of endangering the pilot who had drifted aft of the ship and was in the close vicinity of the ship's screws.

"As the crewman was beginning to tire, a member of the ship's crew came down the Jacob's ladder to assist but this man also experienced great difficulty with the rolling ship and the slippery nylon cargo net. By this time I had drifted under the net and was myself in a position to help our crew-

man. He let go of the net and relied on his life jacket to keep him afloat. I grabbed him and pulled his raft to him. As he held on to his raft, I looped a line through the hoist strap of his life jacket and secured it by means of a snap hook. I told the personnel on the ship to pull him up. His raft was still attached by a nylon lanyard which I was unable to sever as I did not have a knife." (To get rid of the lanyard, the wearer must either discard the entire PR-2 carrying case or cut the lanyard. The lanyard is five feet long and ties at one end to the sea anchor patch on the bow of the raft. The other end attaches to a grommet in the chafing strip of the carrying case. This arrangement is described in BACSEB 18-60.)

"After our crewman was on board, destroyer personnel dropped the same line to me," the copilot continues. "I secured it about my waist, looped my left leg in the Jacob's ladder and held on to the rungs with both hands. I then told them to pull me up and I was brought on board without incident."

The copilot recommends that all destroyers be equipped with helicopter rescue slings (horse collar variety) to be used for rescuing personnel from the water. He believes a rescue sling is much more effective than the cargo nets, Jacob's ladders and boatswains' chairs presently employed. The crewman suggests some kind of training for boarding a rescue destroyer. (Perhaps in training command or RAG syllabus?—Ed.)

In complimenting the destroyer's performance also, the pilot said, "I had no trouble getting aboard and the maneuver was very well executed by the ship." There were some kind words for the PR-2 life raft too: "I would never have been able to take a seat raft out of the aircraft and I feel that the PR-2 life raft is indispensable to overwater helicopter operations. I wish to commend the Navy on the purchase of this particular piece of survival equipment. Our squadron policy calls for the wearing of the PR-2 raft for all overwater flights. I recommend that all helicopter pilots wear it on all overwater flights."

Applying his learned-by-experience survival knowledge to his own line of work, the pilot continues: "I recommend that all pilots using the PR-2 life raft be briefed on the necessity for cutting the cord attaching the life raft to them before a helo pickup. On a helo pickup, a life raft trailing after the pilot adds too much weight and creates a rotor hazard."

Several specific lessons can be learned from problem rescue operations: the life-and-death necessity for aircrewmen ridding themselves of the parachute in the water . . . the need for an improved means of pulling an exhausted survivor aboard the destroyer . . . and the usefulness of the survival knife to both rescuer and rescuee.

During a recent six-month period, 42 pilots and aircrewmen were involved in ditchings and water crashes or ejected or bailed out over the open sea all within operating range of plane guard destroyers and helicopters.

Twenty-six of these men were successfully rescued by plane guards. (Half were involved in

ditchings and water crashes and half in ejections or bailouts.)

About one-third of the 42 men involved were not rescued. (Fourteen of these were in ditching or water crashes and two bailed out.)

All things considered, the plane guard destroyer and helicopter rescue record is good! Nevertheless, there are a number of unsuccessful or extremely difficult plane guard rescues on record which show there is room for improvement in meeting the Navy tradition of taking care of its own.

In evaluating the failure of rescue operations many factors must be taken into account such as aircraft sinking immediately or burning or breaking up on impact; disabling and fatal injuries to survivors; and failure of rescuers to locate survivors because of bad weather, darkness, the vastness of ocean area to be searched, or other reasons beyond control. In this article these elements will be termed "anti-rescue factors."

Many problems continue to plague the airedale . . . difficulties caused by the survivor's failure or his inability to release his parachute . . . boat crews' lack of familiarity with aviator's personal equipment . . . the tremendous effort required for an exhausted survivor to climb up a slippery cargo net or a Jacob's ladder to the deck of a rolling and pitching destroyer . . . communications problems between helicopter pilot, helicopter crewman in the water, motor whaleboat crew and plane guard destroyer . . .

The solutions to some of these troubles are beyond the individual's control. Combined with the "anti-rescue" factors of injury, ocean area, darkness and weather, the difficulties often seem and sometimes become insurmountable.

Rescue reports demonstrate the paramount importance of *continued training of both rescuers and rescuees,* and continued effort to improve rescue preplanning, rescue equipment and rescue operations. (See also "Quick Pickup," APPROACH Nov., 1958.)

Entangled by Lines — An F3H catapulted from a carrier apparently had an engine malfunction and struck the water 500 to 1000 yards ahead of the ship. At or near impact, the ejection seat fired. The aircraft sank almost immediately. The pilot floated with his parachute deployed.

Within seconds, the plane guard helicopter arrived over the crash site and the helicopter crewman descended to the water. Two things prevented the crewman from rescuing the pilot: the pilot was entangled in his parachute and the crewman was unfamiliar with the Martin-Baker single-point harness release. The crewman could not cut the shroud lines because he had no knife.

The helicopter crewman's difficulties were further compounded by the life boat crew. The boat passed over the cable between the helicopter and the helicopter crewman with the result that the crewman was keel-hauled "two or three times." The helicopter pilot overboosted his engine in order to break the cable when the helo was pulled down.

The boat crew, too, was unfamiliar with the Martin-Baker single-point harness release. Finally, they cut the pilot free of his parachute harness and pulled him aboard, followed by the helicopter crewman. The pilot was pronounced dead due to drowning when the life boat returned to the ship.

Confusion Reigned—Shortly after catapult launch, an F3H-2 crashed in the water. As the aircraft struck, observers saw the Martin-Baker ejection seat ejecting from the plane. The parachute didn't have time to fully deploy before the pilot struck the water. Whether or not he was badly injured at impact is unknown; he was at least semi-conscious.

Although during succeeding minutes the pilot was literally in the grasp of the helicopter crewman, a destroyer whaleboat crewman, and swim-

mers from the destroyer, the rescue was tragically unsuccessful.

Many factors combined to defeat rescue attempts. The following is quoted from the Medical Officer's Report: "The destroyer's whaleboat passed over the rescue cable from the helicopter to the pilot in the water, a potentially dangerous situation for all concerned. The rescue boat crew was unfamiliar with the parachute harness release mechanism, which, combined with the difficulties presented by a rough sea and high winds, prevented them from freeing the pilot from the parachute harness and the entangling shroudlines. A lack of communication between the destroyer, whaleboat and helicopter created much confusion."

Attempts to pull the unconscious pilot aboard the boat failed as the deployed parachute dragged him from the rescuers' grasp and under the destroyer. As the pilot was observed on the opposite side of the ship, a destroyer crewman dove over the side in a final recovery attempt. The crewman was able to support the pilot only momentarily against the weight of the sinking parachute before the pilot was dragged under the water and lost.

Among the MOR recommendations is that there should be "a continuing program of indoctrination of helicopter and destroyer rescue personnel on the mechanics of rescue from the various model aircraft, parachute harnesses, and other pertinent survival equipment used by the embarked air group to which they are attached."

The Naval Aviation Safety Center has prepared an audio visual presentation to acquaint plane guard destroyer crews with aviator's personal equipment and harness release devices. This presentation is currently being distributed.—Ed.

Station Crashboat Problems Similar—Although the rescue in this case was by station crashboat offshore, some of the problems encountered are similar to those in destroyer whaleboat operations.

A T2V ditched after flameout downwind in the landing pattern at a naval air station. Both the pilot and dual pilot escaped successfully from the submerged plane although the dual pilot accidentally deployed his parachute in his attempts to free himself from the submerged cockpit.

When they surfaced, a crashboat was approaching. A crewman from the crashboat went into the water to assist the survivors and a few minutes later, the three men were on an A-frame type stretcher lowered by the boat. While the boat crew was hauling the stretcher on board, the weight of the three men and the waterlogged deployed parachute overstressed a metal strap on the stretcher. It snapped dumping the occupants back into the water. (Since this accident, the air station in question has stopped using the A-frame stretcher.)

"What transpired in the next 10 or 15 minutes is not exactly clear to me except that I was having extreme difficulty keeping my head above water," the pilot states. "I do remember being pulled under the water frequently. Also at one time, a second crashboat approached so close to the first that I had an extreme fear of being crushed between the two boats."

The situation went from bad to worse as the pilot was helped inside the tailgate area of one of the crashboats. As the crashboat started back to the boathouse, the pilot was pulled towards the water end of the tailgate—his deployed parachute had fouled in the boat's screws. The crew cut him free from the parachute and the rescue was completed.

"'I feel that if I had taken off my parachute upon reaching the surface, the rescue would have been greatly facilitated," the pilot stated later. "Although I am normally a strong swimmer, my nauseous and weakened condition, coupled with the close proximity of the crashboat, prevented me from carrying out normal water survival procedures.

"With the crashboat so near by, I assumed that I had it made, an assumption which was really unwarranted. Following the recommended water survival procedures to the limit of my ability at that time would have contributed to a much smoother rescue operation."

The dual pilot's account of his rescue experiences is essentially the same. His rescue was somewhat easier because he unbuckled and discarded his parachute before escaping from the sinking plane. However, he was almost overcome by fatigue after being dumped back into the water from the stretcher and nearly being crushed between the two crashboats.

"After much struggling in the water, I became almost completely exhausted and began to lose track of the situation," he states. "Although I did not lose consciousness, I began to feel detachment from reality and have no firm recollection of anything that happened from this time until I completely regained my senses in the hospital."

The flight surgeon states that neither the pilot nor the dual pilot wore an anti-exposure suit though the water temperature was 55°. When rescued, both men were in moderate shock and probably could not have survived much more exposure.

Plane Guard Rescues—Once the survivor has been located, problems in plane guard rescues fall into two general areas: problems encountered in the water and problems encountered in attempting to get the survivor on board the rescue vehicle.

Among the difficulties which occur in the first area are:

- Failure or inability of the survivor to shed his parachute in the water with consequent potential danger of 1) entanglement of survivor and rescuer in the parachute and its shroudlines and 2) the survivor being pulled under water by the deployed parachute.
- Failure of survivor to detach his life raft lanyard (as in the case of the PK-2) or sever it (in the case of the PR-2), before being hoisted aboard helicopter or destroyer.
- Rescue crewman's unfamiliarity with pilot's personal equipment and how to release it.
- Turbulence created in the air and water by hovering helicopters with adverse effect on survivor's ability to cope with parachute and life raft.

Problems of getting the survivor on board the helicopter, the plane guard destroyer or motor whaleboat include:

- Inability of an injured survivor to help himself with consequent necessity for a helicopter crewman or swimmer from a destroyer to go into the water to his assistance.
- Inability of an exhausted survivor in wet flight gear to climb a cargo net to the destroyer's deck.
- Difficulties caused by survivor's failure or inability to release his streamed parachute or his dangling life raft. In helicopter operations, the parachute can be whipped up into the rotor blades and in any case, parachute and life raft are unwelcome additional weight. In motor whaleboat rescue, the parachute can foul in the boat's screws.
- Danger to the helicopter and its crewman in combined helicopter-motor whaleboat operations when the boat passes over the cable between the helo and the crewman in the water.
- Lack of coordination and communication between rescue helicopter, destroyer and motor whaleboat.

One of the best answers to such water survival and rescue problems is training—training on the part of the potential "rescuees" in correct water survival techniques with emphasis on getting rid of the parachute and the life raft before rescue—and training on the part of the rescue crews on how aviator's personal equipment can be released.

Continued effort by aviation and destroyer personnel to improve both rescue training and rescue operations is an absolute necessity to insure maximum success in recovering survivors from the water. ●

Training Plane Guard Rescue Teams

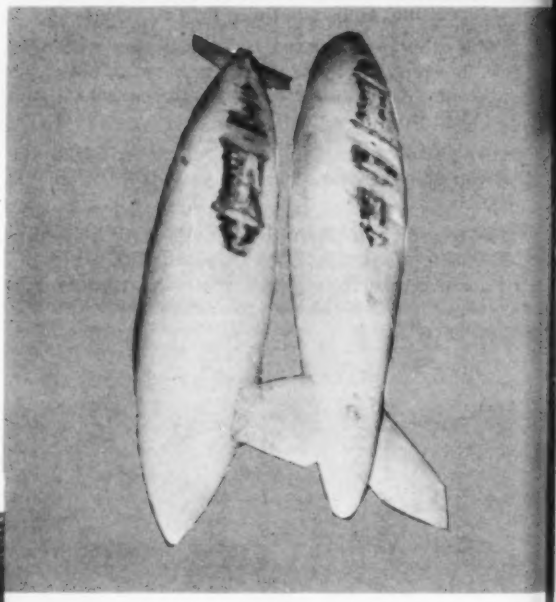
With outstanding initiative, at least one Navy squadron has already taken steps to improve plane guard rescue teams' knowledge of aviator's equipment.

With the cooperation of the destroyers USS HENDERSON (DD-785) and USS GURKE (DD-783), VA-52 presented a series of lectures for 35 men from the two ships. After the lectures and live demonstrations from the cockpit of the AD-6 *Skyraider*, each team removed an outfitted pilot from his aircraft under simulated emergency conditions.

This is a good way for squadrons to help insure successful plane guard rescues. A program of this kind should, of course, be a continuing thing since personnel turnover cancels out the benefits of a one-time training program.

CANDID CAMERA

NOSE DIVE—A discussion of speed and stopping distance in this incident makes it seem similar to a highway traffic accident but no highway driver ever had to maneuver such a vehicle along Route 66. Upon attempting to taxi clear of the landing area the nose wheel cocked to the left, which is a common occurrence in the A4D. In order to expedite his movement the pilot used a relatively high power setting and hard braking. It became a case of "out of the frying pan into the fire" as excessive speed built up which could not be dissipated in 285 feet of deck run. Brakes were released and reapplied five times but skid marks measured a total of 220 feet out of the 285 feet. Engine was secured just prior to rolling into the catwalk.



TILTI—Abnormal three-point position resulted from combination of 45 degree relative cross wind, no wing walkers (wing riders) and premature lowering of full flaps. The wing walker (rider) had left his station prior to the aircraft being lined up with the catapult and the commands involved took action to eliminate this recurrence; pilots were rebriefed not to lower flaps prior to being lined up with cat. Additionally, squadron adopted policy of carrying 300 gallon drop tanks on all carrier ops to minimize damage in event aircraft does roll.

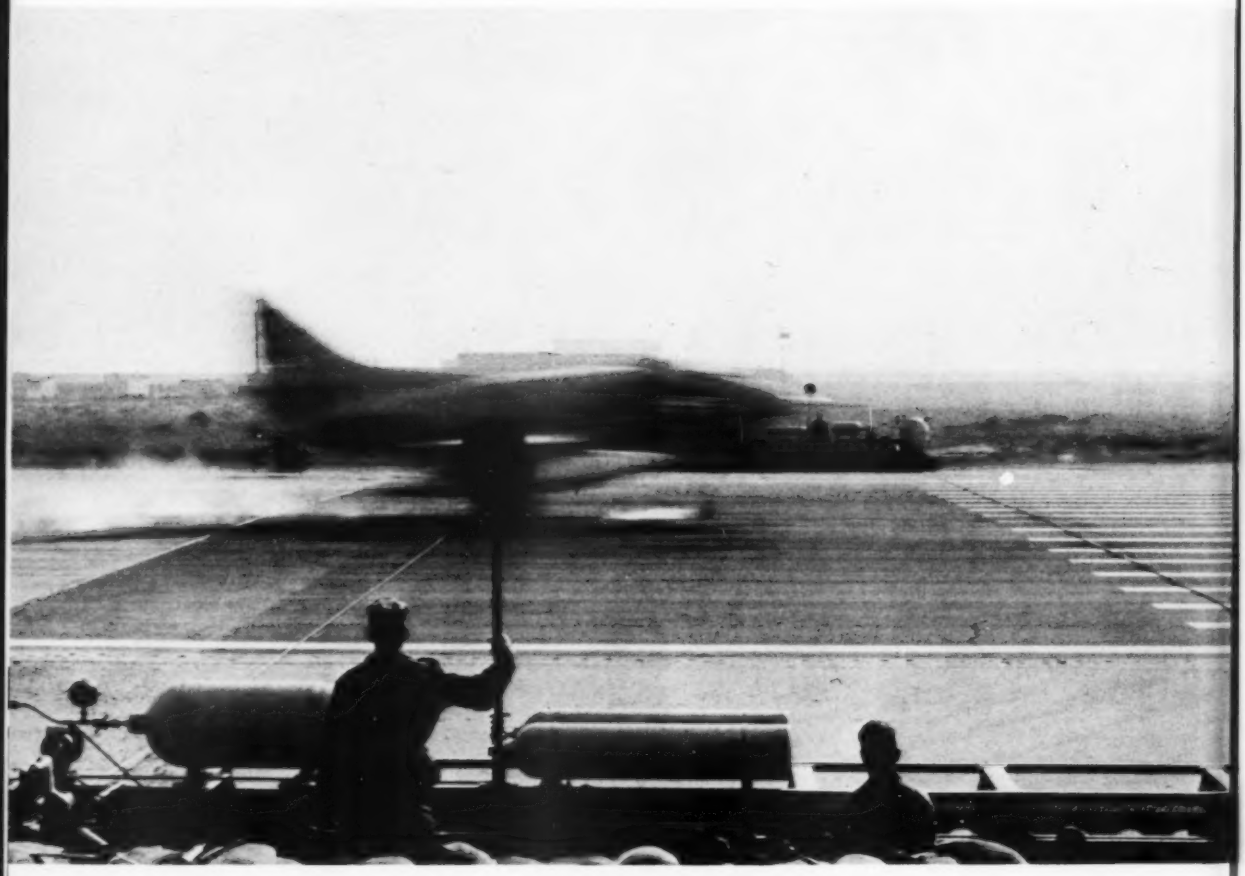
RARE SOUVENIR—These 300-gallon external tanks were damaged beyond repair but apparently were responsible for preventing an accident. They are from an AD-6 which made a night, arrested, inadvertent gear-up landing (fortunately the last wire was engaged). Damage was limited to the prop. A Disassembly and Inspection Report (DIR) indicated no engine damage due to sudden stoppage and the whole affair was classed as an incident rather than an accident. While the pilot is primarily responsible, and the LSO also has a strong interest in the wheel position, the wheels watch in this case made a serious error in erroneously calling "Wheels down" upon sighting the white light on the underside of the fuselage. *He had very little flight deck experience and did not really know what to look for during night ops.*

NO SMOKESCREEN—That's raw fuel streaming from the belly. Alerted to the fact that a white smoke or vapor was trailing from his aircraft, the pilot noted his fuel state near 3500 pounds after only two minutes of flight. Obtaining immediate clearance to come back aboard, he had a low fuel warning light before he could plop it on deck. Fuel boost pump in belly had been smashed, thus rupturing fuel tank. Suspected cause was failure of shackle connecting eye lanyard to pendant, allowing pendant to strike aircraft during cat shot.

TURN FOR THE WORSE—Note the wake of the ship. White flag had mistakenly been given with 20 degrees of turn yet to go. The aircraft was then turning into the groove but continued turn of ship pulled it into shorter groove than usual. Trouble mounted up as LSO gave what turned out to be late waveoff then ship met the turn with rudder and this shifted pilot's lineup to the right. Waveoff attempt failed. The 8T touched down, scraped flap, and boltered, still angling. Significant cause: Incident was a result of everyone concerned being over-anxious to get the ship qualifications underway.

CLIFF HANGER—An old cavalryman, stumbling onto what appears to be a mortally wounded steed, might try to shoot it and put it out of its misery. However this A4D is intact, the other half is hanging down into an open elevator pit. It was parked with one main gear on the elevator and the elevator operator . . . yep, you guessed it, lowered the elevator to take another aircraft below. It wasn't his regular elevator though. The tempo of operations and the personnel situation made it necessary for him to leave his assigned elevator and hurry to take station on another one. He couldn't use the elevator stanchions due to questionable clearance to parked aircraft.

Tailhook types who arrive over an airfield where the Marines have landed may encounter an unfamiliar but efficient style of field arresting gear



MOBILE ARRESTING UNIT

by Col. G. C. Axtell, USMC, CO MAG 12 and
LtCol A. O. Schmagel, USMC, MAG 12

AS most naval aviators are completely familiar with the chain-type arresting gear, this article will attempt to acquaint its readers with the basic nomenclature and characteristics of the "Morest." "Morest" is a code word used to describe a "Mobile Arresting Unit."

A Mark 5 Mod 5 Morest unit consists of two Mark 5 arresting engines that are secured to the deck by stakes, two deck pendants and all the support gear to install, transport and operate the unit. The arresting engines are substantially identical to the Mark 5 arresting engines used on some aircraft carriers. The mission of the Morest is to provide a self-sustaining, mobile and portable unit that is capable of being installed on a small landing strip, for continuous, safe and positive arrestments of airplanes weighing up to a maximum of 60,000 pounds, and engaging speeds, dependent upon the weight of the aircraft, up to 160 knots.

It is further capable of controlling runout (forward travel of the aircraft after engagement) so that all planes, regardless of weight and engaging speed, will come to rest after the same amount of runout, 310 feet for a 240-foot span. Span is the distance between arresting engines. The Morest is designed for use with a runway 200 feet wide; however, any width runway less than 200 feet is acceptable. It has been successfully employed on a runway less than 100 feet wide and can be engaged from either direction.

Morest arrestments are of two types: Fly-in and roll-in. A fly-in arrestment is one which the aircraft lands into the Morest gear with an immediate engagement. A roll-in arrestment is one which the aircraft lands prior to reaching the Morest position and rolls into the gear.

Aircraft approaching for a Morest arrestment make a normal field mirror landing approach to a landing. The touchdown point will be dictated by the type arrestment planned, i.e., a fly-in arrestment will touchdown at the Morest position and a roll-in arrestment will touchdown prior to reaching the Morest; normally at the end of the runway. At the 180-degree position the pilot reports his landing weight to the LSO or the Morest operator who directs that the arresting engine aircraft weight selector be set to this weight.

In order that the correct aircraft weight selector setting may be made the applicable aircraft weight and balance book should be consulted to obtain the aircraft's basic weight. Pilot weight, oil, trapped fuel, etc. and all fixed equipment for normal operation is then added. The landing weight may then readily be computed by adding the fuel remaining and any external stores not included in the basic weight.

Squadrons normally provide the Morest crew with its particular aircraft operating weight and the pilot merely reports the number of pounds of fuel aboard. The Morest crew adds the fuel weight to the given weight and sets the aircraft weight selector accordingly.

Figure 1 provides the maximum permissible engaging speeds at the landing weights specified of various naval aircraft presently in operation. The maximum permissible engaging speeds specified must be respected at all times. Failure to do so

Mark 5 Mod 5 Morest Gear

Engaging Speed Limits

Aircraft Model	Landing Gross Weight Range	Maximum Permissible Engaging Speed
AD-5, -6, -7 Series	Under 17,000 (lbs)	112 (knots)
except AD-5W	17,000 - 19,500	105
	19,600 - 21,000	101
AD-5W	Under 16,500	115
	16,500 - 19,000	107
A4D-1, -2 Series	Under 15,000	130
AJ-2 Series	Under 36,500	100
	36,500 - 39,300	97
F3D-2 Series	Under 18,000	130
	18,000 - 22,000	123
F4D-1 Series	Under 19,000	130
	19,000 - 21,000	125
F9F-8 Series	Under 18,000	130
F11F-1 Series	Under 19,000	130
F2H-2 Series	Under 15,500	130
	15,500 - 17,500	128
F2H-3, -4 Series	Under 18,000	130
	18,000 - 19,500	129
F3H-2 Series	Under 24,500	118
	24,500 - 27,000	113
	27,100 - 30,000	108
FJ-3, -4 Series	Under 19,000	130
FBU-1 Series	Under 18,500	130
	18,500 - 20,500	127
	20,600 - 23,000	121
S2F-1, -2 Series & TF-1 Series	Under 23,000	111
	23,000 - 26,000	104

Fig. 1

may result in structural failure of the aircraft and/or arresting gear as well as injuries and/or fatalities among operating crews. Since aircraft runouts are constant (310 feet for a 240-foot span) for a wide range of engaging speeds and weights, applied retardation loads will increase significantly with relatively minor increases in engaging speeds.

In general, a 5-knot increase in engaging speeds will result in an increase of 8 percent in applied deceleration load. Constant runouts do not provide the long runout warning which operators of

older type arresting gear found useful in detecting excessive engaging speeds. It is, therefore, extremely important that pilots be kept aware of the consequences of exceeding the maximum permissible engaging speed specified in Figure 1.

When making a fly-in arrestment every effort should be made by the pilot to fly at the recommended carrier approach speeds specified in the applicable flight manual. These recommended speeds should permit an arrestment within the weight/speed limitations. There will be some instances, however, when approach speeds will exceed those engaging speeds specified. Where this occurs, the *excess* airspeed must be equal to or less than the available wind-over-deck (WOD).

For example, a squadron is to be recovered at gross weights around 20,000 pounds. Assume that, when referring to Fig. 1, the following values are specified for this aircraft model:

Landing Gross Weight Range (Pounds)	Maximum Permissible Engaging Speed (Knots)
Under 18,500	130
18,500 - 20,500	127
20,600 - 23,000	121

From the above data, the maximum permissible engaging speed is 127 knots for a gross weight of 20,000 pounds. This squadron's approach speed history indicates that 142 knots is the best they can do consistently, as a group, at this gross weight. This gives 142 minus 127 or 15 knots excess airspeed. This means that at least 15 knots of available WOD would be required to land these aircraft safely. Assume, however, that the available WOD is only 8 knots at the time of recovery. By instructing the pilots to remain aloft and burn down to a fuel state giving a gross weight of 18,500 pounds or less, a maximum permissible engaging speed of 130 knots may be used.

At these weights, the squadron can fly an approach airspeed of 134 knots. This gives 134 minus 130 or 4 knots excess airspeed, which is satisfactory, since it is less than the 8 knots WOD available. In place of remaining aloft and burning down, another alternative is available to these aircraft. If the position of the Morest allows, these aircraft could land short of the Morest and decelerate to 135 knots or less prior to arrestment. Considering 8 knots WOD, this would be an engaging speed of 127 knots which is within the permissible engaging speed for 20,000 pounds.

The actual landing weights listed in Fig. 1 do not in themselves constitute authority to recover at such weight. The latest applicable flight manual must be consulted for authoritative data on permissible loading conditions and maximum recommended carrier landing gross weight.

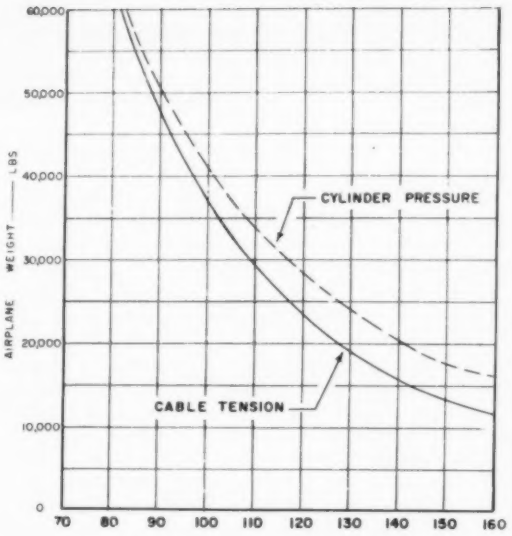


Fig. 2. Capacity Curve, 240-foot span

Figure 2 provides a capacity curve which amplifies the information contained in figure 1 and provides the reader with engaging speeds for aircraft not listed in figure 1. The curve, for a deck span of 240 feet, is plotted on a basis of airplane weight versus engaging speed and indicates the relation between these two factors and the allowable cable tension and engine cylinder pressure. By knowing the weight of an airplane, the maximum safe engaging speed can be found by locating the weight on the vertical scale of the graph and drawing a horizontal line from that point through the solid black line labeled "cable tension." From the point of intersection of the "cable tension" line, a line is drawn vertically to intersect the base of the graph which is plotted in engaging speeds. The intersection of the vertical line and the base indicates the maximum safe engaging speed.

If the weight and engaging speed are known and the intersection of the respective horizontal and vertical plots intersect below and to the left of the cable tension line it is then within the capacity of the Morest installation to arrest the aircraft. If the intersection of the lines falls above or to the right of the cable tension line, the weight or engaging speed must be adjusted accordingly to fall below the line.

The dotted line represents safe arresting engine cylinder pressure plotted as a function of airplane weight and engaging speed; however, since the safe cable tension falls below safe cylinder pressure it becomes a limiting factor and all operating conditions will be determined in terms of safe

cable tension. For example, an A3D can be arrested if the drag chute is deployed and decreases the speed to that permissible for a roll-in arrestment. Recently at a Far East base an A3D of an estimated 55,000 pounds was arrested at 80 knots.

An aircraft making a fly-in arrestment employs the same procedures as those for shipboard operations. After touchdown the pilot advances the throttle to 100% RPM to facilitate a takeoff in the event of a bolter and to stabilize the aircraft at pendant peak out. The power should remain on until the pendant is fully extended. The throttle is then closed and the aircraft permitted to roll rearward. This allows the pendant to become disengaged. The hook is then retracted and the aircraft is either taxied off the runway or executes a takeoff for another trap.

Aircraft signals for brakes, hook up, etc., given by the plane director are standard carrier signals. Going to 100% RPM upon engagement is especially important in aircraft like the A4D as several incidents of aircraft being tilted upon a wing have been attributed to pilots decreasing power too rapidly. Failure to keep tension on the pendants at complete runout allows the aircraft to be pulled rearward at such a rate that when the nose wheel reverses direction, there is sufficient momentum developed that may cause the aircraft to tilt upon the wing. Uneven pendant runout or uneven braking on roll-back can also have the same effect.

An aircraft making a roll-in arrestment executes a mirror approach to the end of the runway and then rolls into the gear. The pilot concentrates on a centerline engagement, dropping the hook just prior to reaching the gear. Braking is not used prior to arrestment. This involves no radical change of technique as braking of most aircraft is not commenced until the aircraft has decelerated to below 100 knots and arrestment normally occurs prior to this point in the landing roll. Heavy aircraft with high landing speeds, for example the F4D and F8U aircraft, normally employ this type arrestment. This procedure allows the aircraft to decelerate prior to arrestment to ensure that the weight and speed limitations of the gear are not exceeded.

Morest Position—The Morest can be installed at various positions on the runway depending upon its primary employment. It can be employed as an arresting device for every landing, short field arresting gear, abort arresting gear, emergency arresting gear and a training device for carrier deployments. Regardless of the position of the Morest installation it is extremely advantageous to position it near an egress taxiway to facilitate an expeditious exit for arrested aircraft and an ingress for crash and rescue vehicles in the event of an emergency.

When the Morest is employed primarily as an arresting device for every landing it is normally positioned at or near the center of the runway length and "roll-in" arrestments are employed.

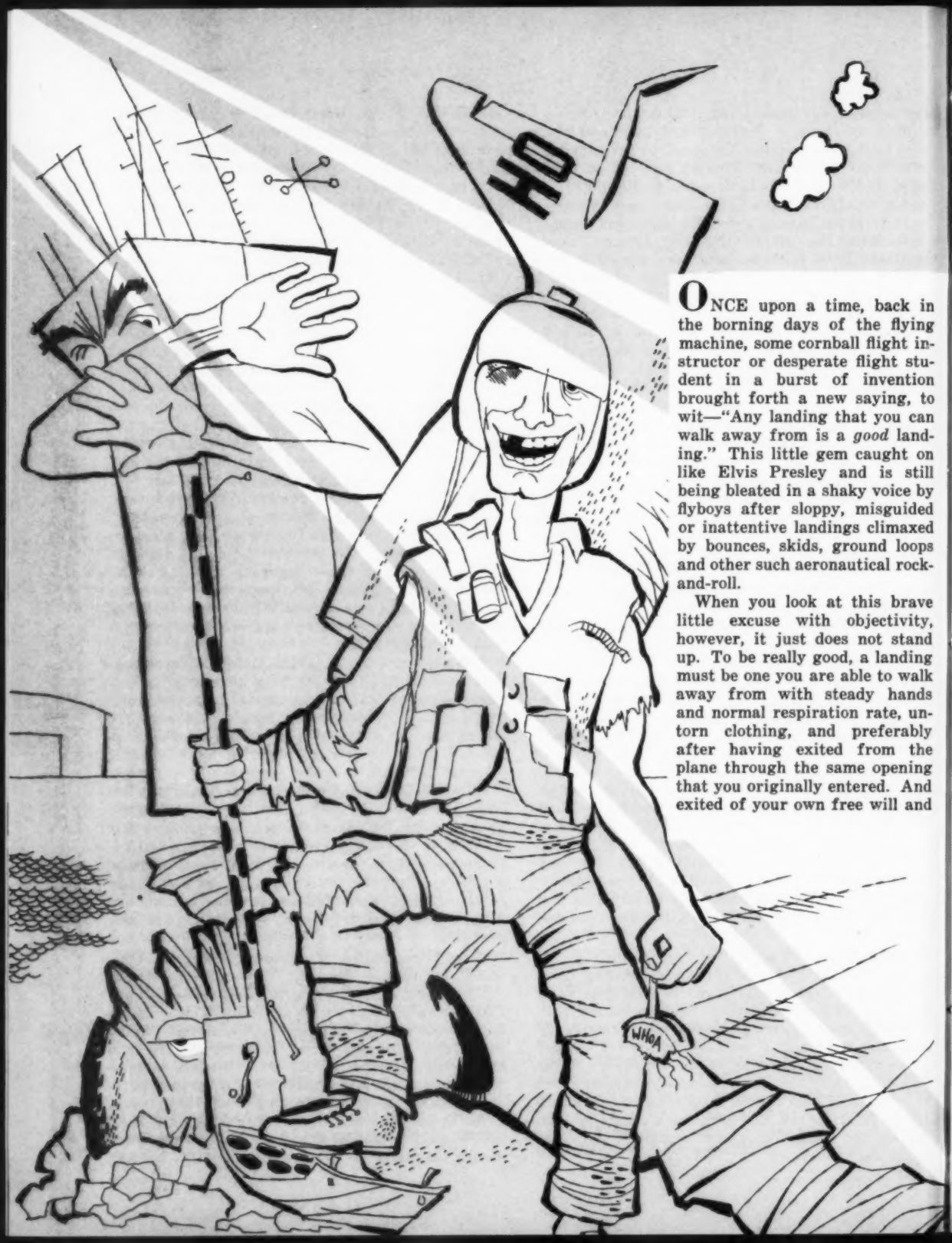
It has been determined that employing the Morest to trap every landing has increased the life of the tires and brakes and decreased the possibilities of aircraft running off the end of the runway in the event of a brake failure or inadequate braking action due to water or ice on the runway. This procedure facilitates either a wave-off in the event of a bolter or stopping on the remaining runway by employing normal braking. The Morest at this position of the runway can also be employed as abort arresting gear, short field arresting gear and emergency arresting gear.

It may also be employed as a training device for carrier deployments. This type of training is limited to those aircraft that can make fly-in arrestments. For this type training the Morest is normally installed approximately 1000 feet upwind of the end of the runway. The mirror is installed upwind of the Morest at a position that will cause the aircraft to touchdown just prior to the first pendant. To prevent structural damage of the aircraft at these engaging speeds due to excessive sink rates, a maximum glide path approach angle of three degrees is recommended. The aircraft executes a mirror approach to a landing with the hook down.

After being trapped, shipboard procedures are used to clear the aircraft from the gear. After disengagement the aircraft makes a takeoff from that position for subsequent traps. A 30- or 40-second interval is adequate for subsequent landing aircraft. This interval is dependent upon the experience level of the pilot and handling crews.

With the Morest in this position it can also be employed as a short field arresting gear and abort arresting gear for opposite direction traffic. The short field arresting capability is restricted to those aircraft that can make a fly-in arrestment or a roll-in arrestment utilizing the 1000 feet prior to the Morest to decelerate to ensure that the weight and engaging speed limitations are not exceeded.

A word of caution is necessary for A3D pilots intending to use Morest. Twice in one week, A3Ds took the gear with pressure set for FJ and F9F aircraft. Both instances resulted in snapped deck pendants and damage to the Morest equipment from whipping cables. It is mandatory that the Morest crew know the A3D intends to take the gear and an acknowledgement of proper pressure setting must be received from the ground prior to engagement. Emergency limits are then 50,000 pounds and 90 knots. A respectable figure in any league.



ONCE upon a time, back in the borning days of the flying machine, some cornball flight instructor or desperate flight student in a burst of invention brought forth a new saying, to wit—"Any landing that you can walk away from is a *good* landing." This little gem caught on like Elvis Presley and is still being bleated in a shaky voice by flyboys after sloppy, misguided or inattentive landings climaxed by bounces, skids, ground loops and other such aeronautical rock-and-roll.

When you look at this brave little excuse with objectivity, however, it just does not stand up. To be really good, a landing must be one you are able to walk away from with steady hands and normal respiration rate, untorn clothing, and preferably after having exited from the plane through the same opening that you originally entered. And exited of your own free will and

"I can't look!"

by Benjamin O. Bibb

motive power.

For instance, my great and good friend, Chas Birdsong exited unexpectedly from a PBY minus some teeth, most of his clothing, and goodly patches of skin. He walked away. This was a good landing? Try to convince him! He never found out which unauthorized area he exited through, either, since the old peebee was a total loss, but he suspected it to be in the area of frame sixty at position eleven o'clock, high. Head first.

The old wartime Navy *Wildcat* fighter, as some few may recall, had mechanical gear operated with a crank and a curse by pilot-power. GRIND (grunt) clank, and the gear went down a few inches. A certain *Wildcat* squadron was training on the West Coast, getting all sharped up for deployment to WestPac, and the squadron skipper was saddled with a group of embryonic Rickenbackers who loved to live dangerously and to fly more than somewhat flashier than recommended. With their very own talent they had developed a landing maneuver that combined all the worst elements of an overhead approach, a scatter break, a divebombing run terminated by a desperation pullout just over the end of the runway, and finally a frantic cranking down of the gear just in time to avert a belly landing. Of course, a successful execution of this program made them feel quite reckless and warriorlike, but unfortunately a certain percentage landed like a forgetful gooney bird—with feet still tucked into tail feathers.

A few letters and messages from Admirals and various Near-Holy agencies caused the skipper to have more than a few touches of acid indigestion, and he passed the word down in no unsworn manner that the next wheels-up landing would earn the landee a seat at the long green. Things went just fine for quite a time, but then a poor Ensign made the classic error that has been with us since the invention of retractable gear. He simply forgot.

The *Wildcat* touched down on its belly, skidded along the runway until the right wing dropped, then hurtled off the runway onto the grass. Immediately thereafter the nose dug in and the plane flipped over on its back, sliding along in a cloud of dust until it stopped. Crash trucks and vehicles were converging on it by this time, and as they surrounded the *Wildcat* and the dust settled, the emergency crews heard . . . *GRIND (grunt) clank* . . . and the wheels started . . . UP!

He walked away from it, though. After the plane was picked up so he could get out. Good landing. It qualified.

We controllers have a nice grandstand seat to such un-

This humorous treatise on the serious subject of safe aircraft landings was written by LT Benjamin O. Bibb, who is presently stationed at NAS Jacksonville where he is serving as RATCC Watch Officer. His original enlistment in the Navy dates back to 1936. In 1954 he was commissioned as an LDO in Aviation Operations. He is a graduate of the Air Traffic Control Officer's School, CIC Officer's School and the FAWTULant All-Weather Intercept Course at Key West. Fourteen years of experience in the fields of air traffic control, CIC/CCA and all-weather air intercept control work more than qualifies LT Bibb as an astute observer on the subject of landings.

In Lt Bibb's own words, ". . . I entered the hospital the day after finishing the article with a preliminary diagnosis of gastric ulcers with massive bleeding. This diagnosis proved incorrect—the correct one being moderate prolapse gastric mucosa with massive bleeding. In other words, wind-wagon chauffeurs with their (sometimes) uncoordinated landings, misguided takeoffs and unattended climbouts made my stomach lining collapse into a bleeding mass. . . ."

Moral: Make good landings!

scheduled entertainment. I have had pilots call me in the tower and say something like, "Hey, man, you see the way I greeeeased ole four six five in on the back of the wheels that time?" I would say, "Huh?", and they would be highly insulted. The average pilot does not realize that superlative landings are the expected to the controller and go unnoticed. The miserable or downright terrible landings are the ones that catch the controller's eye. And of course the completely unsuccessful ones.

A good and experienced controller can sometimes spot a landing that is going to be noticeable while the plane is in the traffic pattern. I have seen final approaches from the tower where I could almost see a sign hanging from the nose of the machine saying in bold letters—

ATTENTION, PLEASE. WATCH ME CREAM THIS ONE.

I remember quite well the day that Ski, old friend, made one of the most horrifying landings in an R4D that it has ever been my misfortune to observe. During the last two or three hundred yards before touchdown he appeared uncertain, but after touching down he appeared totally unqualified. I do not have any idea of how many times he bounced, each time with a wing going down to an impossible position and holding there until just inches off the ground before he could get it up. I do know that he went off the runway once on each side before he finally halted the beast and taxied in. I remarked to the controllers at the time that there went the only embarrassed looking R4D I had ever seen. Truly it was embarrassed—feathers ruffled, head down, and tail tucked under. It looked like it wanted to cover its numbers somehow. Ski called me on the telephone a short while later.

YOU WROTE The Caption

The hapless* Ford *and its captor pictured on page 17 of the February* APPROACH *have prompted the biggest response yet to the You Write The Caption feature.

Along with captions by the dozen came some very fine safety suggestions too: "Keep the main gear chocked and tie-down on the nose gear until the aircraft is ready to move. Make the ship's motion work for instead of against."—A. J. Richards, AGC, NAS, Moffett Field.

Most of the captions were fish stories. Here is a sample, space permitting. Thanks to all contributors.

"Jack up the nose a little more, Joe."—*Marty J. Hall, AD3, VT-27, NAAS New Iberia, La.*

"Haul in the ladder, I'm aboard."—*ENS Don G. De Luca, VU-1*

"Hey, Joe, how much air does it take?"—*S. J. Reden, VMF(AW) 513, MAG-15, MCAS, El Toro*

"Should I hit it again, Chief? It's still breathing."—*LTJG A. Apap, CIC School, Glynco NAS*

"Looks a little bit like a Minnesota Walleye to me."—*LCDR W. L. Connel and boys from Central Office, NAS Mpls.*

"HELP"—*LTJG David R. Ayres, USNPGS, Monterey, Calif.*

"Climb aboard, Ford."—*Members of VF-102*

"Whistle? WHAT Whistle?"—*Members of VF-102*

"Standby to repel boarders."—*LT John F. McCabe III, U. S. NavTrngDevCenter, Port Washington, N. Y.*

"Hurry up, the skipper's in it!"—*LCDR Jack O'Neill, NTDC, Port Washington*

"Take me to your ladder."—*James E. Seale, PNCA, CNABaTra Staff, NAS, Pensacola, Fla.*

"Waddaya mean? This tire ain't flat."—*Eugene K. Stallard, JO1, NAS Grosse Ille, Mich.*

"Hey, man, you see that landing I just made?"

"Yeah. Cool, man. Real crazy."

"Did it scare you?"

"Scare *me*? H— no! *I* wasn't riding in that bottom-heavy monster!"

"But you guys are supposed to take care of us—worry about us and all that jazz," he complained.

Then I told him. I could not help it. I just came out with it. "DON'T YOU EVER DO THAT AGAIN ON MY WATCH!!", I roared, and hung up the phone. Good landing. Yessirree. Sure it was. Terrifying, but a walkawayer.

There was a young Second Louis who ran out of gas in a T-6, dead-sticked successfully into the field, then ran out of experience and serenity at the same time and skillfully nosed the bird up on rollout. He scrambled out and ran, but somehow managed to pull the ripcord on his chute in the process. He turned to scoop up the billowing nylon, tripped and fell down. An ambulance roared up, made a lousy approach, ran over him, broke his leg.

This was not a good landing. He did not walk away from it. He ran a short distance, then rode the ambulance.

But as long as we are plagued with aerial vehicles, controllers will be forced to watch landings, both unnoticeably good ones and highly noticeable bad ones. And pilots will still say, "Any landing that you can walk away from-and-so-forth." Well, you boys have your little sayings. Tomorrow you will find notices on all your bulletin boards saying—

I have the day watch for the remainder of the month. You have given me ulcers and hysteria, now give me good landings. ELSE COMES EVERYTHING CROSSWIND. ●

"How could my goggles being down have helped?"—*LT Dave Turner, Helicopter Training Branch U. S. Fleet ASW School, San Diego 47, Calif.*

"Standby for heel to port."—*Members of VF-102*

"But Sir, the sign said Follow Me."—*Ware, YN1, NASC*

"But, Chief, the elevator was full and the 'yellow shirt' said to get it up on the flight deck."—*LT P. E. O'Gara, ComFAirMed—Staff*

"Chief, you say a P2V dropped this thing. Commander, what do you say?"—*LTJG C. L. Anstine, USNR, Fleet Air Intell. Trng Center, Atlantic*

"No, I won't take it. There's not enough oleo showing."—*From Student Readyroom, VT-30*

"Ready One, this is the IWO, you have a Ford that isn't secured for heavy seas."—*LT. D. L. Moss, VA-25*

"I wonder who is going to scale it?"—
"When does the countdown begin?"—
"Tires are good but you need a little body work."—
"The AG's forecasted gusts to 60 kts, but they're not always right."—
"Since when did they build reverse into these things?"—*Jekins, D. T., ACT3, Shahbazian, R. A., AGAN, Tappen, R. H., AG3, Operations, NAAS Whiting Field*

"Now, after that Ford clambers back aboard, we'll try the cat shot again."—*Bill Kershner, Piper Aircraft*

"Do you think he's big enough to keep or should I throw him back?"—*LTJG D. W. Kohli, VP-10*

"Do you really mean, *MAKE IT FAST*, Bosun?"—*A. J. Richards AGC, NAS, Moffett Field*

"Tweet! Tweeet!! TweeeeT !!!! tweet?!?"—*Allan F. Krynicki, AQ2-P1, VF-102*

"Hey, Chief, look what I caught."—*"Two Blackshoes," NAS Quonset Point*

"No, Sir, I don't usually bring it up this way but all the elevators were full.—*ENS G. T. McCullough, HS-1*

"Well, Sir (line officer), I was just standing there minding my own business when it jumped over the side."—*Members of VA-23*

"No, Sir. The VALLEY FORGE has always had an axial deck."—*Walter W. Hall, Jr., Captain, USAF, Flying Safety Officer, 33rd Air Division*

"He told me to have it washed before chow."—*LCDR P. A. Brandorff, ASO, ComFAirSoWestPac*

"Not a bad catch for a 20 lb line with a blue gill hook."—*LT Roy Fell, Personal Aide, DCNO (Development)*

Why Grown Men Cry

On takeoff roll, at a speed of about 115 knots, the canopy of an A4D came open. The hinges and bungee piston rod broke with the canopy going clear of the aircraft. "Only the handle position was checked when I went over the takeoff checklist," said the pilot. "The locking hooks were not checked." As a consequence it was concluded that the pilot caused the occurrence since the canopy was apparently not fully locked.

For carrier operations the squadron was directed to paint a green canopy alignment mark on the canopy and fuselage. This is to permit flight deck personnel to perform an exterior check prior to launch.

Unfortunately the mere presence of the alignment marks has not caused the problem to go away. An example is a recent A4D catapult shot: While being positioned on the cat, the exterior of the plane was checked by the catapult officer and the squadron assistant maintenance officer. Security of the canopy was among the items to be observed and canopy/fuselage alignment marks were used as part of the check. The aircraft appeared ready for launch but when approximately one-third the distance down the catapult the canopy came open.

This pilot stated that he did check the canopy hooks to see that they were over center on the canopy rollers and they were satisfactory. He did not remember checking the position of the canopy handle. Witnesses stated that the alignment marks were in proper position. However investigation revealed that when the handle is placed from the center to the over-center position, the amount of travel is very small. From a distance of several feet the lines would appear to be aligned when the canopy is not fully locked. Because of canopy adjustment, it is possible for the hooks to appear to be over-center on the canopy rollers when the canopy handle is not in the full locked position.

Alignment marks (arrow) show canopy completely closed.

Slight offset in alignment marks show canopy not completely closed.

So now what started out to be a supposedly simple operation, that of keeping the wind and rain out of your face with a greenhouse, has turned out to be something complicated and treacherous.

According to one squadron, in order to be sure that the A4D-2 canopy is securely latched, a pilot must first check the position of the handle to make sure it is in the full over-center position and then check the position of the hooks to make sure that they are at least ⅛ inch over-center on the canopy rollers.

In hot weather and at desert bases it is policy for many units to allow a pilot to taxi for takeoff position with canopies open. Under these circumstances, with nobody to check external alignment marks, the word "Canopy" in the five item takeoff checklist must lead to positive action: "Touch canopy lock handle FORWARD—visually check hook POSITION."

Recheck

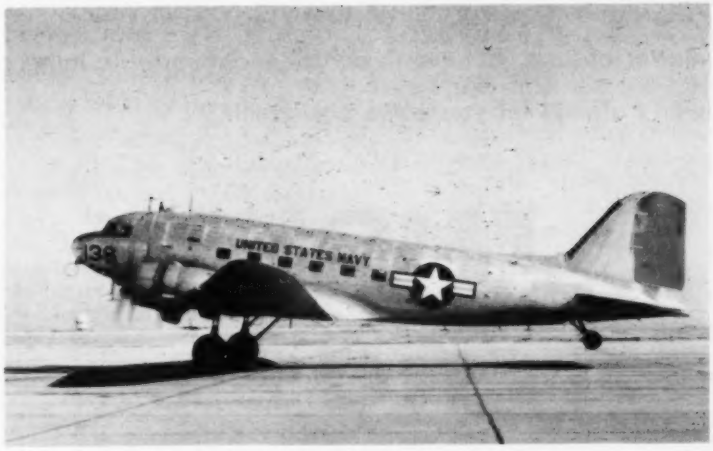
THE crew of the R4D-8 were experienced although the plane captain had not been active in an R4D crew for six months. Engine run-up and the checklist had been completed and after receiving ATC clearance the pilot was cleared for takeoff. The plane captain was briefed to raise the gear.

As the aircraft rolled down the runway he was crouched down in the aisle between the pilot and copilot, and was in such a position that he could not see out the windshield. V_2 speed had been computed at 96 knots. Approaching this speed the pilot reached over to retrim the elevator tab. The plane captain, tense and watching only the cockpit interior, saw the pilot's hand move toward the trim tab and mistook the movement for a wheels-up signal. No verbal command had been given.

Up came the gear lever and up started the wheels. Airspeed was calculated at 93 knots. The pilot was unaware of the plane captain's actions but he felt the aircraft settle and applied back pressure on the yoke. Examination of the runway showed an 80-foot stretch of hash marks, beginning about 2100 feet from the takeoff end of the runway, but the R4D became airborne successfully.

Other than the settling, the only discernable difference in aircraft operation was a momentary change in prop synchronization. Engine instruments showed satisfactory performance. After landing at destination the damage was discovered. About three inches of the port propeller tips were bent.

This flight was to have been the plane captain's requalification check. He flunked.



Mistaking pilot's hand movement for briefed signal, plane captain raised gear.

Quotable Quotes

"THE most helpful items of any survival gear, in addition to the ejection seat with auto-harness release and automatic-opening parachute, were the sheath knife, flashlight and compass.

"The sheath knife which survived the ejection was lost from the scabbard while walking out. During the first part of the walk frequent checks invariably indicated that my direction of travel had drifted as much as 90 degrees to the right. It took considerable mental effort to make myself stop frequently to check my heading.

"My predominant impulse was to proceed straight ahead in any direction blindly and only thoughtful consideration caused me to believe and follow the compass. The flashlight (red-lensed) was effective in detecting trees, holes and some of the underbrush. Had I been in an open area the flares would obviously been useful but as I landed in dense woods they did not appear effective."

—From an AAR

The difference between an incident and an accident is often a matter of luck. But luck is a frail undependable thing and won't always let you come out smelling . . .

MIGHTY LIKE A ROSE

Strip Tease

F8U-1P Pilot: 3900 total hours, 340 in model—

While at 20-thousand feet a photo pilot spotted his target. He made a modified split-S to descend to 1600 feet for oblique shots of an assigned area. During the first part of run, pilot skidded left and right to facilitate getting required coverage. Airspeed was near 300 knots. On final portion of run, while in balanced flight, the nose cone came off.

Pilot heard noise like an explosion in nose section and noticed windscreen cracked with hoses, lines and other associated equipment streaming back along the side windscreen. Aircraft buffeted severely accompanied by a tremendous roaring noise, both of which continued during remainder of flight.

Return to field was made at low airspeed and final landing utilized angle-of-attack indicator as the pitot tube was missing. Since nose cone was not recovered material failure could not be proved. It was the opinion of investigation authorities that the nose cone was not locked properly.

Tenacious Tow

F8U-2 El Toro

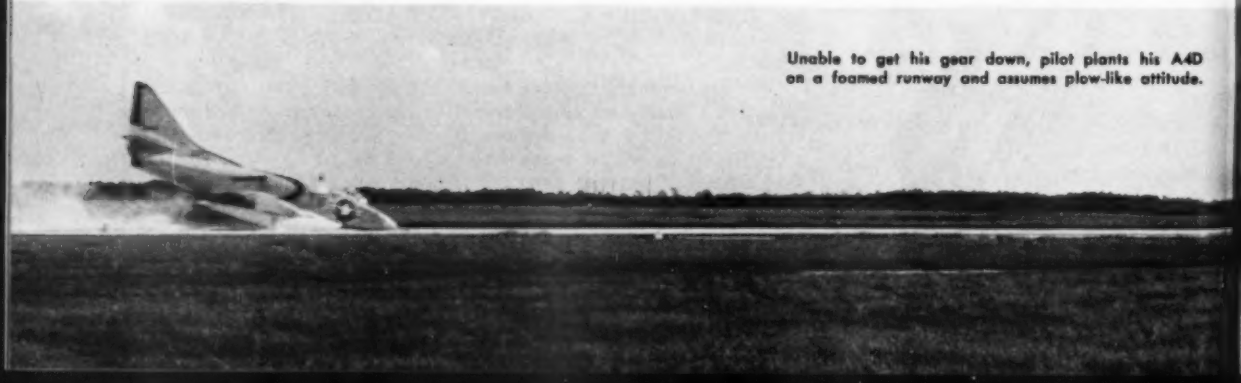
Wx: Clear with 8 miles—

Pilot was unable to release tow cable and landed aircraft with tow cable attached. The tow cable struck, knocked down and broke power and telegraph lines at the approach end of runway 34 right. The aircraft was not damaged.

Recommendations: That power lines at approach end be buried underground and poles removed. That aircraft forced to land with banner or tow cable be diverted to MCAAS Yuma, fuel permitting.

If fuel does not permit diverting and local wind and weather permit, runway 25L should be used as there are no obstacles other than a road at the landing end. Station operations must be alerted in sufficient time for the police to control traffic on the road until the aircraft with hung tow has passed.

Wind and weather not permitting a landing on 25L, it is recommended that aircraft land on



Unable to get his gear down, pilot plants his A4D on a foamed runway and assumes plow-like attitude.

runway 34L and utilize the morest gear.

(This is not printed to expose the problem at El Toro but to cause other units to check their "Hung Tow" procedures. This situation does not come up too frequently but when it does it requires a little more thought and attention than a routine landing.—Ed.)

He Had a Short Cable And No Ball at All . . .

HSS-1N ASW Mission—

On third dip sonarman lowered sonar ball until 3 to 4 turns of cable were left on reel. He then released lowering switch and the reel slowed but continued to turn. When about ½ turn of cable remained on reel, the sonarman put "raise-lower" switch to RAISE in an attempt to keep the cable from running all the way out. At this time the cable parted from the reel at the quick-disconnect.

Sonarman suspected he had a weak brake but took no precautions to prevent loosing the cable and ball.

Recommendation: Sonarman should always assume poor or no braking action. Lower ball until there is one layer (6-7 turns) of cable remaining on reel then release "lowering" switch so braking action can be safely checked. Subsequently the ball should be "beeped" to the fully lowered position.

Water, Water, Everywhere

F4D-1 Carrier recovery
Pilot: 4000 total hours,
180 in model—

A light rain had begun to fall prior to the launch of a routine CAP. An hour later the rain had increased to moderate intensity. Upon completion of the patrol the flight was cleared for individual Tacan-CCA approaches and the lead plane arrived at the ship prior to its completing the turn into the wind.

The F4D pilot remained below a broken cloud layer in visual distance from the ship. Weather was logged at an estimated 300 feet broken, 500 feet overcast with visibility one-half mile in moderate rain and fog. Under these circumstances cockpit visibility became critical. Moderate rain causes water to pile up on all three windshield panes of the F4D and the pilot is completely blind on the mirror glide slope. He must be talked down by the LSO.

A slight overshoot and power adjustment led to a bolter on the first pass. The next approach was similar but with improved lineup. The LSO gave continuous lineup and altitude information commencing 30 degrees prior to intercepting the glide slope. When it looked as if the aircraft would bolter again the LSO asked for a high dip. Crossing the ramp, the right wing dipped but rolled level as deck contact was made. Upon engaging no. 2 wire the port oleo piston failed. Runout was made on the port drop tank and oleo stub.

The broken port wheel assembly bounced, ripped a hole in the wing skin, struck the aft nose wheel door in passing, and bounced off the end of the angled deck.

Comment: The continued success of pilots being talked aboard by the LSO when moderate to heavy rain conditions exist is very doubtful because the margin between normal sink rate and "failure" sink rate is so narrow.

Sandblower Takeoff

F9F-8T Pilot: 1800 total hours,
44 in model

Using obsolete takeoff chart, pilot computed 7200-foot roll on 9000-foot runway with 25-foot obstacle to be cleared. In order to clear obstacle, he pulled nose off and retracted gear. During retraction gear doors brushed runway, beveling two inches on aft edge but pilot unaware of this. In pilot's opinion, if he had not raised gear, he would have hit obstacle.

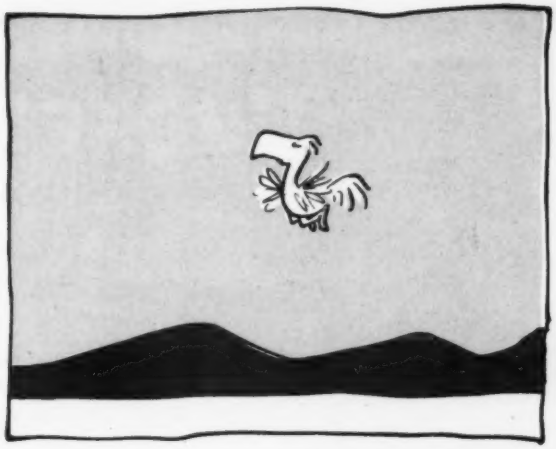
At 30 feet above runway, temperature measured 93°. Upon recomputing with correct takeoff chart, takeoff roll of 8500 required and without obstacle clearance. Incident just barely missed being an accident. ●

Sherman Field crash crews surround aircraft but there was no fire and only minor damage from slide.

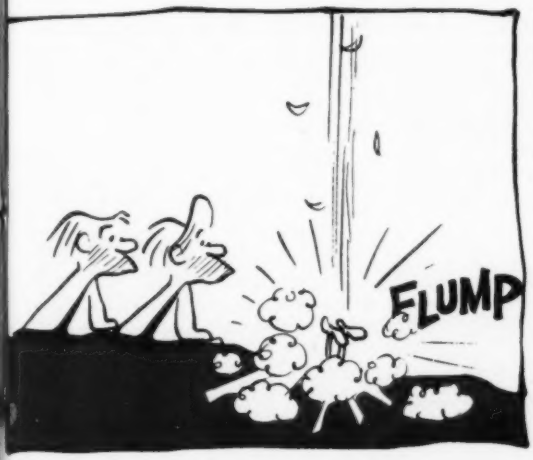
BY
JOHNNY
HART

A CUMULONIMBUS CLOUD, SOMETIMES CALLED A THUNDERHEAD.
© 1960, New York Herald Tribune Inc.
Trade Mark Reg. U. S. Pat. Off.

BOOM
WHANG
ZOWIE



RACKITY
WHAM
SLAM
BLAT


FLUMP

THEY'VE BEEN KNOWN TO TEAR A BIRD TO PIECES.

THE day was overcast (1500 feet and 10 miles) but aerology forecast no change for the next five hours so we mice filed for a three-hour local with two HSS-1s. We were attached to a CVS in port for a weekend and as we were relative strangers to the area, we decided on a checkout of the area.

Our section of helos struck out to the northwest and we spent an uneventful two hours looking over the strange countryside. Returning to the local area we met lowering clouds at a thousand feet. A call to the tower reassured us that the field was still VFR with 1500 and 7. We continued south to pick up the coastline and make the normal helo entry to the field.

Lower and lower went the ceiling and the two birds likewise, until at 200 feet we realized we were fighting New England type fog rolling in from the south. The section started a turn back but the wingman lost us in the turn and we next heard him tell the tower that he had reached the coast and was inbound to the field.

So, back to the south we went too. After all we can fly lower and slower than most birds, man-

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. As the name indicates these reports need not be signed. Forms for writing Anymouse Reports and mailing envelopes are available in ready-rooms and line shacks. All reports are considered for appropriate action.

— REPORT AN INCIDENT, PREVENT AN ACCIDENT —

made or otherwise. We made contact with the coast all right, and headed for home. However, we had to start measuring visibility in feet instead of miles and finally at 40 feet and 40 knots, with the beach just barely in sight, we decided this had gone far enough. It was either land on the beach or try out all that hood time in the log books.

I went on the gages and the copilot tried a couple of calls to the tower without success. We realized we were too low for UHF and it happened that the HF was out. The birddog was pointing straight and true to the homer nearby so we decided to gain the necessary altitude in a holding pattern on the homer (nobody in the soup down this low—we hope). After all our wingman buddy was able to do this.

After climbing and calling we finally got contact at 400 feet altitude, receiving a clearance to 1500 feet and a GCA pickup. By golly this gage flying is okay, we thought. Breaking out at 500 feet on glide path things brightened up considerably and we went on in for a landing.

Our wingman? When confronted with the same situation he put down in a backyard and used a telephone. Next day, with better weather, he flew back to the field.

Here was a case where two helo pilots thought they could fly lower and slower than the weather. Granted, one did find a landing spot and one did gain radio contact *after* entering the soup. But it might have been different in either case.

Next time this Anymouse will remember that, regardless of what machine he is driving, when VFR minimums are reached do an immediate about face, rather than be suckered into thinking that man has finally built a machine that ole' man weather can't bother.

ROUTINE TRAINING FLIGHT

BEFORE we launched from Naple's Capodichino airport, the weather man had warned us of scattered thunderstorms in the area. Now five miles south of the field we hit the first heavy rainshowers. I saw several bolts of lightning to the west. Our *Willie Fudd* (WF-2) was following radar vectors at this time and after a few steers to get us around heavy weather, we took over with our own aircraft radar.

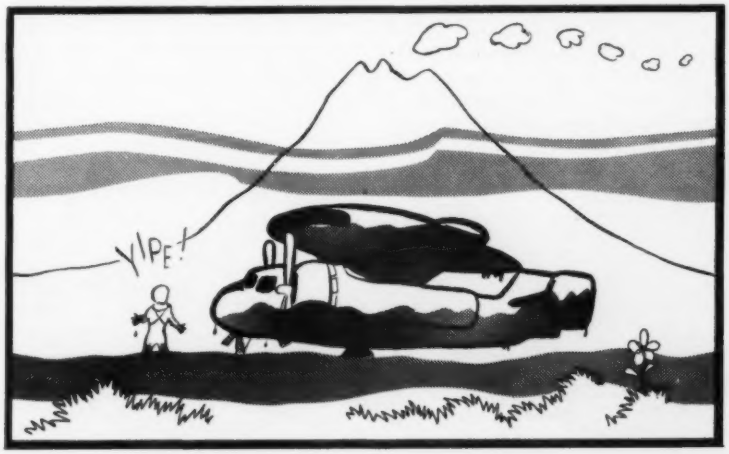
The radarman steered us to a "clear" area about 10 miles ahead. Then when he said we should be in the clear the worst weather of the trip hit us: Turbulence, heavy rain, and small hail. The freezing level was 9000 feet and we were at 8-thousand. Lucky for us this was a training hop. The scope showed no break in the weather around us and we couldn't afford to be steered into any more "clear" areas. When I asked Naples GCA for a clearance back to base I found even our avenue of retreat was threatened. Naples was less than two miles in heavy rain. Only one runway was available and it had a direct crosswind of 25 knots.

After some vectoring to get in position for the most direct approach GCA came up with the sobering announcement that, "We no longer have you in radar contact. We have lost electrical power and are transmitting on battery power." As I automatically rogered my mind was on other things. Some training—how do we get out of this mess?

Meanwhile the aircraft had arrived in an area of fairly good weather but even more important we were over a small airport. Visibility was about two miles in light rain and we decided to attempt a landing. One low pass over the field showed us we would have about 3500 feet of runway with a crosswind from the left.

On the first approach we overshot the wind line and waved off. The next attempt put us in good position and we splashed onto the runway about 500 feet from the approach end. Our speed had been a bit high and braking action was poor. When only half of the distance remained to go we realized we were going to go off the end. I cut the mixture, the pilot cut the mags, fuel, and alerted the crew.

With only a couple hundred yards to go the nose began weathercocking to the left and the whole aircraft moved closer



to the right of the runway. Luckily it was flat grassy terrain to the side and at the end. We went off the end and side in a dead heat, a coffin corner situation, and slid in mud for about 300 feet.

It was a silent crew that gathered outside to look the airplane over but we brightened up when we found no apparent damage. Heavy rain hit about that time and viz went to about a half mile. Congratulations were in order. We had just made it.

When the weather cleared we found out just how close it was. Mount Vesuvius loomed big and clear just an "arms length" away.

SHIFTY STORY

DURING an adventure last spring, when I was playing for keeps with a very low ceiling and visibility, I would receive "on-course, on-glidepath" from GCA down to about 400 feet above the ground. Then I would start going high and drifting right.

Several weeks later I had occasion to go into an Air Force base where there was a 300-foot broken ceiling. Visibility was 5 miles and it was daylight so I had a chance to observe an interesting phenomenom—*wind shear!* Right at the ceiling the wind shifted 90 degrees and with no change in heading, a man would end up to the right of threshold by a good 200 yards.

Afterwards, I probed my memory for details of the earlier experience and came up with this set of circumstances: Surface wind had been southeast at 5 to 10 knots. A quasi-stationary front moved just enough to cause a wind shift to the southwest at 8 to 10 knots, but the warmer unstable air was only 400 or so feet up. The resulting wind shear at 400 feet produced the sudden formation of cloud next to the ground (a one-degree spread) which added complications to my GCA runs.

Each approach was normal down to 400. I had to hold about 5 degrees right correction to take care of the SE crosswind. Then at 400 feet, instead of a wind from the right, I came under the influence of the SW wind. As my landing direction was to the NE, this put a 10-knot wind directly on my tail. Meanwhile, there's five degrees of heading correction which is no longer needed; the plane drifts to the right. GCA thought I was unable to hold headings and I thought it was bad GCA gear or operators. Neither GCA or myself had smarts enough to recognize the sequence of events for wind shift.

My opinion on why I started going high on glide path is a controversial one: With a sudden wind shift to the tail, my IAS was momentarily less and sink rate increased. I added power but by this time the aircraft simply used the extra power to accelerate and climb.

I think this little-studied aspect of weather may account for some of those mysterious last-minute divergences from course and glide-path which result in busted airplanes.

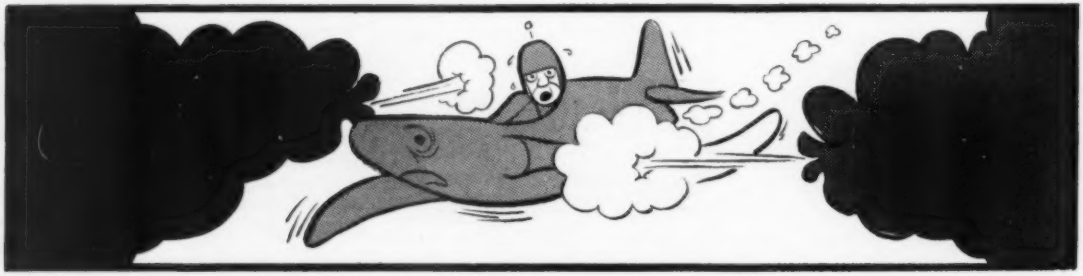
● *It can, and has — on both landing and takeoff. Insufficient data is available to us at this time, but weather types prefer to term wind shift as wind shear, GCA should be alert to its possibilities too.—Headmouse*

HANGOVER

LANDING the S2F aboard was uneventful. The spotting was not. As was his habit the taxi director used a reference line on the deck to spot the aircraft. Therefore, he was not watching the starboard wheel as we turned to parallel the deck. Unfortunately the taxi director chose the line used for A4Ds instead of the one for S2Fs.

To add to the trouble the copilot selected this moment to start securing the radios instead of maintaining a lookout. When he looked back outside the cockpit he was horrified to see the right wheel roll up onto the coaming of the flight deck—onto the blast deflector protecting the catapult operator which extends out *over* the catwalk. He hit the brakes!

At that point we still had 30 degrees to turn for our spot and



we would have swung the starboard wheel about a foot out into the airspace over the catwalk. It is hard to see how we could have avoided an accident if the aircraft had fallen into the catwalk.

Flight deck reference lines are an aid, not a substitute for headwork. Possibly they could be marked in some way so as to eliminate confusion. In this case the A4D lines were much more prominent than those for other aircraft.

ENGROSSED

I WAS No. 3 man in a flight of five F4Ds departing an Air Force Base. After starting engines we were to check in on tactical frequency prior to going to ground control. Several minutes after lightoff I noticed a wingman giving me hand signals to come up on tower freq. After switching I could not hear or apparently transmit. On the previous flight I had trouble with my D-500 radio connection so I tried to tighten it. At this time the canopy was closed to reduce engine noise.

While still working on the radio connection I saw the other aircraft start out of the line. I swung out in my turn but still concentrated on trying to get radio contact. At last I achieved partial success and checked in with the flight.

As the first two aircraft took the runway my radio connection was finally secured and I took the runway as a single. Shortly after takeoff I looked down to find the canopy in the latched position rather than locked. This situation has led to the loss of canopies all over the country and I could just see my name added to the list.

Rather than fool around I held what I had in airspeed and made a downwind entry followed by a soft-as-possible landing, feeling a little foolish and a lot luckier than I had reason to expect.

I had become so engrossed with the D-500 connection that I didn't give my cockpit a complete check until I was airborne.

INTERNAL DRAG

WE TWO junior LTJGs departed Quonset Point in an S2F, bound for Ohio on an instrument cross-country. The copilot was fresher than I but I considered him qualified for the trip. In accordance with squadron policy, and to stay out of icing conditions, provision was made with RATCC to climb on top locally where the tops are guaranteed to be 8000 max.

White card minimums applied to takeoff conditions but we were off and running on a tacan climbout. Immediately after getting wheels in the well my gyro horizon went nuts. Oh well, they got us fairly proficient on partial panel in the training command so we continued. Of course the Tacan was next to go but radar is a wonderful invention.

Center now thoughtfully changed our altitude to 10,000 feet and in spite of good old aerology's guarantee, we are still in the soup. A temperature of —20°C. keeps the ice accretion low. The cockpit heater? Naturally it doesn't work. I'll have to remember to check that before takeoff the next time. About this time we managed to replace the fuses in tacan and Gyro horizon and we have full panel again.

Twenty minutes later I noticed an amazing lack of airspeed and requested the copilot to check for ice while I eased on more power. This ridiculous situation ends up at 105 knots with normal rated and the inability to hold altitude. Down we come while the copilot passes the word to Center. Passing through 9500′ friend copilot says in a timid voice, "Guess who accidentally put the radome down?" Things rapidly improved with all the drag retracted. From now on no IFR for me unless the copilot is checked out in model.

HARA-KIRI

OUR F8U squadron was scheduled for a short deployment and as a result, I found myself on an actual instrument cross-country. Due to the fact that a full-dress blue inspection was also scheduled during the deployment, I had to include a sword in my baggage.

The only place the sword case would fit was in the cockpit, so I stowed it alongside the ejection seat on the port side. During the penetration at destination, on actual instruments at 5000 feet, I lowered the gear and attempted to raise the wing incidence handle.

However, the sword case had fallen forward and blocked me from the handle. It was easy to push the case back and I raised the wing. But during this distraction the aircraft went to a rapid nose-down turn. Recovery was made at 2200 feet indicated altitude. Lucky for me the hills in the immediate vicinity were only 2100 feet high.

This hazard may be prevented by building a sword compartment into all naval aircraft. ●

HEADMOUSE

Have you a question? Send it to Headmouse, U.S. Naval Aviation Safety Center, Norfolk 11, Virginia. He'll do his best to help.

Dear Headmouse:

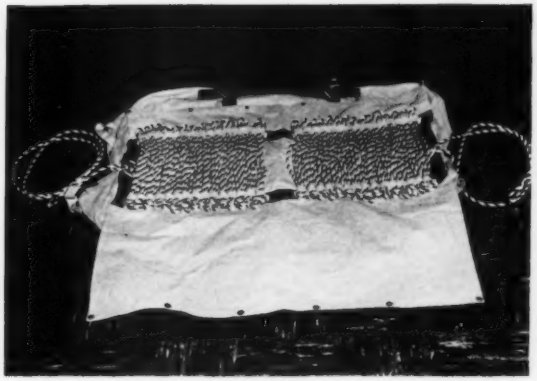
Some of your readers may be interested in the following survival equipment project, the result of the ingenuity and work of the Aviator's Equipment Branch of the Jacksonville NAS Aircraft Maintenance Department assisted by Fleet Air Wing 11.

Basically, this new survival equipment is an improved modification of standard survival gear dropped from the bomb bay of the P2V *Neptune* patrol bomber on SAR missions. The modified equipment consolidates three survival packages into a unit which requires only one air drop. The three survival packages—a Gibson Girl container, an ADSK "bomb" and a Mark 7 life raft container are linked by a 210-foot floatable plastic line (see photos and drawing). All three containers are buoyant and watertight. The total weight of the equipment is 228 pounds.

Two parachutes are used, one on the Gibson Girl container and the other on the ADSK "bomb." The containers are parachuted out of the P2V at 50-foot intervals. This spreads the equipment out over a

P2V SPECIAL — This layout of survival equipment which has been conf[illegible] for P2V *Neptune* SAR missions clearly demonstrates how ingenuity and standard av[illegible] supplies can be incorporated into improved survival techniques. Here, Chief Pa[illegible] Rigger William C. Goodson (left) and Marshall Mazyck, PR3 prepare the SAR e[illegible] for a test drop by a P2V of Patrol Squadron 1B.

The "bomb" package . . .



. . . its envelope . . .

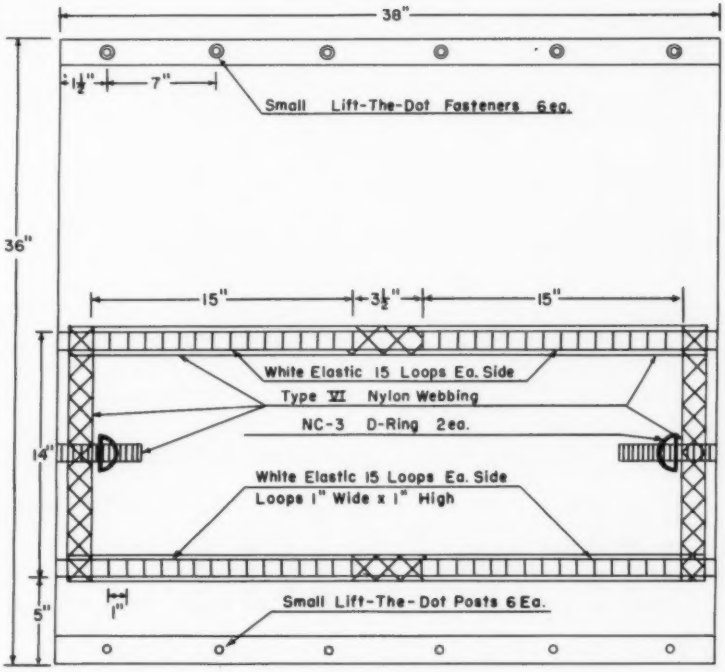
large area, and makes it more accessible to survivors. As storage for the line, a 34" square piece of rubberized fabric is sewn to the Mark 7 life raft container with elastic "hesitator" loops for parachuting. A cover with snaps prevents the line from getting hung up in the aircraft during the drop and a D-ring is attached to each end of the container for the guide lines.

The "bomb" contains 6 blankets, 6 leg splints, 4 first-aid kits, 2 wire mesh splints, 2 torniquets, twelve large first aid dressings, 4 chemical heating pads, 2 waterproof containers of matches, 3 Mark 6 drift signals, 3 Mark 2 life vests, a flashlight, a tube of chapstick, 12 dye markers, 3 packages of shark chaser and a sheet of instructions.

The Mark 7 life raft contains an ADS-1 signal kit, 8 message drop capsules, an ADR-1 sustenance kit, 8 Mark 6 drift signals, 3 desalting kits, 3 solar still kits, a hand pump, 2 bailing sponges, a corner reflector, 3 large emergency ration cans, a compass, a jacknife, a whistle, three oars, a signal mirror and a line attachment for the Gibson Girl which is in the third package.

The following material was used:

- *SAR Raft Equipment:* (All this material except the line is procurable through Section H or from salvage.) MK-7 raft container. Material for line pocket: Old raft container or any suitable material of this type; type 6 nylon webbing, 265"; elastic webbing, 128"; NC-3 type D-ring, 2 ea; NC-3 type V ring, 4 ea; snap, quick release, 2 ea; snap, signal halyard, 2 ea; snap fastener, lift a dot, 6 ea. Polyethylene floatable line, 210 ft., must be procured through open purchase.



. . . manufacturing details.

AN/CRT-3 Gibson Girl: Procurable through Section H, comes equipped with a parachute.

ADSK-1: Drawn from ASO catalog dated 10/59. Stock No. R4220-611-6592-LA20, GR 4220, page 4, item 1. This also comes equipped with a parachute. Blankets and medical supplies for this unit are drawn from the Medical Department. All other equipment put in the ADSK is standard survival equipment and is carried in Section H.

The new technique was tested successfully by VP-18 in the St. Johns River. Now all P2V squadrons of Fleet Air Wing 11 are adopting the new technique. These include VP-5, VP-16, VP-18 and VP-30.

L. J. LEARY, LCDR

UP and OUT

ON A cat launch from the carrier, the shuttle ramp struck the underside of an F4D-1 and severed fuel lines. The aircraft became engulfed in flames. In a split second the exchange Air Force pilot decided to eject. However, in order to get more altitude with what little airspeed he had left (an estimated 160 knots), he eased back on the control stick and placed the aircraft in a 35-degree nose-up climb. While holding the stick back with his right hand, he reached up and pulled the face curtain with his left hand. At the time of ejection, the aircraft had reached 250 feet, its highest altitude above the water, before nosing over and crashing into the ocean. The pilot was rescued by helicopter, the crewman entering the water to assist him onto the rescue seat.

The significance of this accident lies in the fact that the pilot successfully ejected from an altitude of 200-250 feet using a standard ejection system modified by a zero-delay parachute lanyard. During preflight, the pilot noticed the absence of a zero-delay lanyard and requested that the plane captain get one for him. The plane captain did so and the pilot attached it just prior to launch. The pilot later stated, "The zero-delay lanyard definitely saved my life."

A significant survival factor was his rotation of the aircraft's nose up through 35 degrees. In addition to slowing his airspeed and gaining a few feet of altitude, this directed the path of ejection in such a way that its main vector was in a reverse direction to that of the direction of the plane, thus dissipating much of his forward speed.

On the negative side, the pilot had on a dark grey Air Force flight suit and an APH-5 helmet painted light grey. The rescue helicopter pilot states, "This could have made locating him very difficult if I had not seen him eject." (BACSEB 1-60 prescribes fluorescent tape for helmet marking for high visibility.)

The survivor's experience while being hoisted aboard the rescue helicopter underscores the value of retaining the hard hat until rescue is complete. As the rescue hook and line began to spin and sway, his head struck the side of the helicopter. The glancing blow was absorbed by his helmet. Without his helmet he could have sustained serious head injury.

RARE PHOTO of a not-so-rare type of mishap this month elicits comments from the Flight Surgeon. Readers may recognize this one-of-a-series of photos (Sept. '60 APPROACH) depicting a successful zero-delay lanyard.

Nose Breaker

COMING in for a landing after a night training flight, a T28B was waved off by the tower when the aircraft was lined up with a grass strip halfway between two runways. However, the aircraft touched down in the grass, rolled ahead for nearly 400 feet and struck a partially-buried culvert which sheared the nose gear. It then bounced into the air. On final contact with the ground, the right main gear collapsed and the right wing fuel tank ruptured. Sliding 156 feet in a concrete drainage ditch, the aircraft sustained further damage. Fire broke out as it came to a stop.

At the point of maximum deceleration (believed to have been when the aircraft made initial contact with the culvert), the pilot was thrown forward. At the same time, his APH-5 helmet rotated forward and downward over his eyes. The top center portion of the helmet struck the top part of the instrument console, driving the helmet into the bridge of the pilot's nose. He sustained a compound fracture.

- The pilot's inertia reel was unlocked at the time of the accident.
- His APH-5 helmet did not have a nape strap.
- His helmet chinstrap was loose.

The occupant of the rear seat of the aircraft was uninjured. His inertia reel was locked and the chinstrap of his APH-4 helmet was secured; he retained his helmet.

Rough Ride

ON COMPLETION of an air-to-air gunnery flight, the pilot of an F9F-8B made a normal touchdown. Although initial braking was effective subsequent braking failed. The pilot attempted to lower the hook but was unsuccessful. He made a bad situation worse when he failed to reduce power completely after touchdown and forgot to pull his emergency brake bottle.

The plane continued down 9000 feet of runway, 1000 feet of extension and 2500 feet of well-packed sand. The nose gear of the aircraft did not touch until the last 1000 feet and was only bouncing from time to time then. About 150 feet from the final point of landing the aircraft went off the end of a sand dune and struck a second sand dune 45 feet ahead. At this point, the main landing gear severed and buried itself. The plane skidded in a nose-up attitude 57 feet into a third dune where it finally stopped with a considerable impact.

Here is the pilot's account of his rough ride:

"From the cockpit it looked as if I was approaching a drop-off that for all I knew was the depth of Grand Canyon," the pilot states. "I braced myself hoping for the best. Fortunately for me, the drop-off was the first of three about 10-foot high sand dunes. The first impact was extremely rough; the second was rougher and threw my body forward in the shoulder harness. I believe all landing gear sheared here. The third impact which was the roughest threw me back in the seat and sent what seemed like an ocean of sand at the plane and in the cockpit through the open canopy. Here we finally came to a stop.

"The shoulder harness and seat belt functioned superbly and I heartily endorse them as the life-saving or at least serious injury-saving factor in this accident."

Which to Use?

WITH the advent of low level ejection seats such as the Martin-Baker and the RAPEC, some aviation personnel seem to entertain the thought that because the seat is equipped with two means of ejecting the occupant (face curtain handle and secondary firing control handle), it is permissible to use either in any case. *This is wrong!* The face curtain handle is the *primary* means of ejection. The face curtain itself helps to protect the face from windblast and aids in proper body positioning. Good body position is easier to maintain while reaching the primary (overhead) ejection handle, thereby minimizing the danger of back injury due to ejection forces.

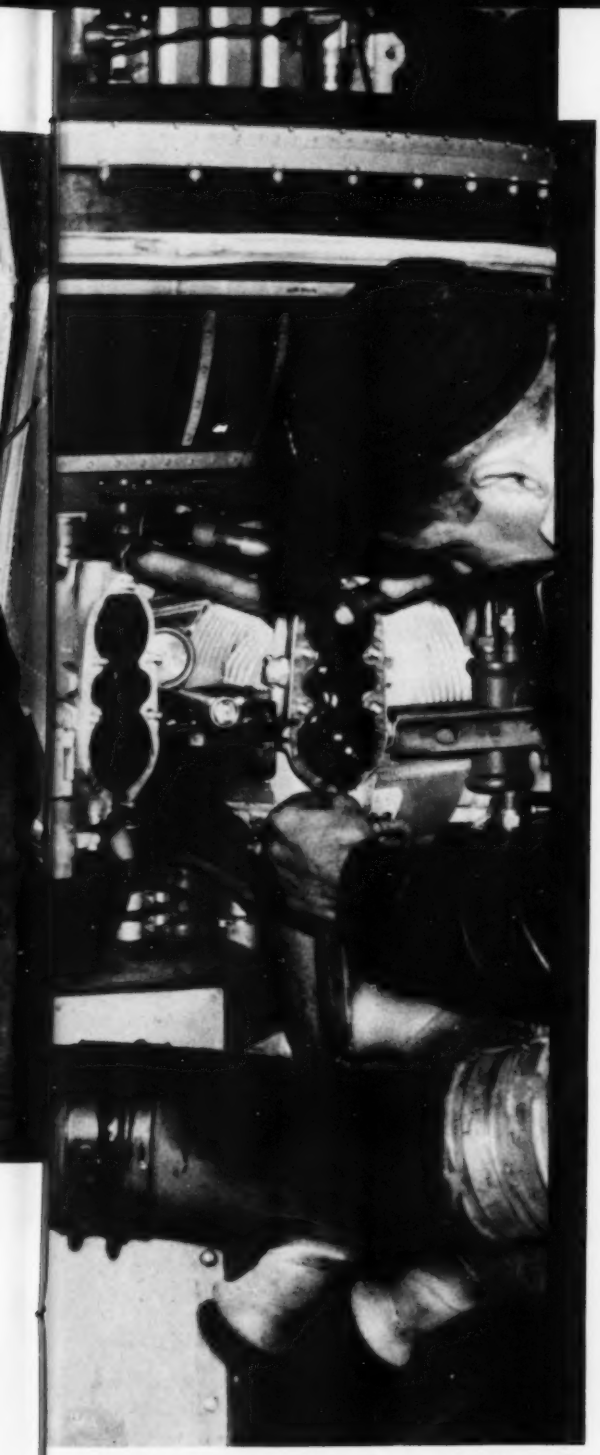
The *secondary* firing control handle (located on the forward edge of the seat bucket) is to be used only in the event that the primary face curtain handle cannot be reached or is inoperative. It is obvious that by using the secondary firing control handle the pilot loses the added face protection of the face curtain. But what is even more important, the tendency of the pilot to lean forward while grasping the secondary firing control handle puts him in the position to sustain serious back injury.

However, pilots should train themselves so that in the event of difficulty in reaching the face curtain in an ejection they automatically go for the secondary firing handle.

Use of the secondary firing handle can save seconds which can be priceless in the seat separation, parachute deployment sequence.

The first pilot to successfully eject from an A4D-2N in the RAPEC seat had difficulty reaching the face curtain because of G-forces. Finally, "with the help of his right hand" he was able to get his left hand on the curtain and activated the seat at about 15,000 feet. He had been adequately briefed, trained and instructed in the use and availability of the seat's secondary firing handle but because it was different from what he had previously been flying with and *because he was under stress*, he failed to remember the secondary means of firing the ejection seat. ●

ENGINE TIMING



Adapted from American Airlines Weekly Maintenance Letter

INTERNAL combustion engine theory is a subject that's drifting further and further into the background while the jets take the lead. But presence of the turbines neither simplifies reciprocating engine operation nor diminishes the need for efficient and dependable power plants in the older airplanes. We still fill a lot of seats behind the old piston knockers.

We published this article at the height of the piston era and believe that a rerun will help refresh our savvy for the old work horses to keep them sound, at the post, and in the money. As long as they bear our colors they deserve their share of the best.

Engines low on poop or which shudder and groan, or those which belch fire, may have timing trouble.

We often restrict our timing thinking to ignition, but the valve actuating system is equally important. A previous WML dealt with correct mixture of fuel and air. This article stresses the importance of getting the right quantity of that mixture into the cylinders and lighting it at the right time.

Valve clearances not only determine how wide the valves open but more important, how long they remain open. Tight clearance results in an earlier opening and later closing valve; therefore, valve timing is not only a matter of properly meshing cam and cam drive gears during engine assembly, but also precision in adjusting valve clearances to establish the duration of valve openings.

To obtain high power, it is necessary to operate the engine at high RPM. To get the exhaust gases out and the fresh charge in, during the short time available at high RPM, it has become necessary to increase the relative time that the valves remain open. This results in valve overlap with both valves partly open during the end of the exhaust stroke and beginning of the intake stroke. At high RPM, the inertia and high velocity of the exhaust gases tend to empty the cylinder rapidly.

At the same time, a high manifold pressure at the early opening intake valve helps push out the lingering exhaust gas and ensures that the combustion chamber is crammed full of fresh charge.

Phoney Manifold Pressure—At low speed, when exhaust scavenging is poor and the manifold pressure is lower than the pressure in the exhaust stack, there is a reverse flow set up across the cylinder so that exhaust gases actually enter the intake pipes. This affects manifold pressure. The pistons are struggling to create a vacuum in the jug but the reverse flow across the jugs permits enough back pressure to raise the manifold pressure to 20 or 22 inches, instead of 15 inches as in

some engines with less valve overlap.

In the previous WML, we told you that a lean mixture burned cooler than a best power mixture. It also burns *slower*. When the mixture is too lean, the late burning flame during idling can enter the intake pipes and, on nondirect injection engines like the R-2800, cause backfiring. This also accounts for the tendency of these engines to backfire during descent with lean mixtures. With the propeller windmilling, the manifold pressure is low and again, during the valve opening overlap, a late burning flame can enter the induction system. A tight intake valve clearance tends to aggravate this condition. During high speed operation, tight exhaust valve clearance tends to impose a heavier load on the cam and actuation system. An early opening valve is being pushed open against a greater pressure than a late opening valve. On the other hand, a loose exhaust or intake valve clearance, because it causes the valve to remain open for a shorter period of time, reduces the mass overflow through the engine and therefore reduces the power output. Valve timing is a compromise between tight settings that promote heavy loading and tendency to backfire and loose settings that cut down on airflow and power.

Effects of Excessive Valve Clearance

Tests by Wright Aeronautical Division indicate that operation of R1300, R1820 and R3350 engines at takeoff RPM conditions with valve clearances of .80 will consistently fail the valves in 10 hours or less. The failures result from high seating velocity and loads imposed on the valves.

Excessive clearances can result from:

- Improperly torqued valve adjusting screw locknuts which back off.
- Flattened or broken tappet roller or bushing.
- Broken rocker arm.
- Broken push rod ball end.
- Broken rocker arm ball end.
- Failure of valve spring.

When evidence exists that intake or exhaust valves have been operating with high seating velocity a cylinder change or perhaps an engine change will become mandatory. To insure accurate valve adjustment of .010 on the R3350 and .010 to .017 on R1820 and R1300 engines, always turn the crankshaft in the direction of rotation when bringing piston to top dead center—never back up to TDC. If piston passes TDC—turn the prop shaft back at least 90 degrees then bring piston to TDC.

Fuel Timing—On direct injection engines, spraying the juice into the fire box at the right time is also important. Not only do you have a problem of timing the injection pumps to the engine but you also have a big headache of getting them synchronized (each supplying the same amount of fuel). When dual pumps are not synchronized, front and rear cylinder row power outputs are not equal. When one bank is pulling more than its share of the load, it usually runs hotter than normal and the cold bank is the one that is loafing. Having dual cylinder head temperature instrumentation tips you off to this condition.

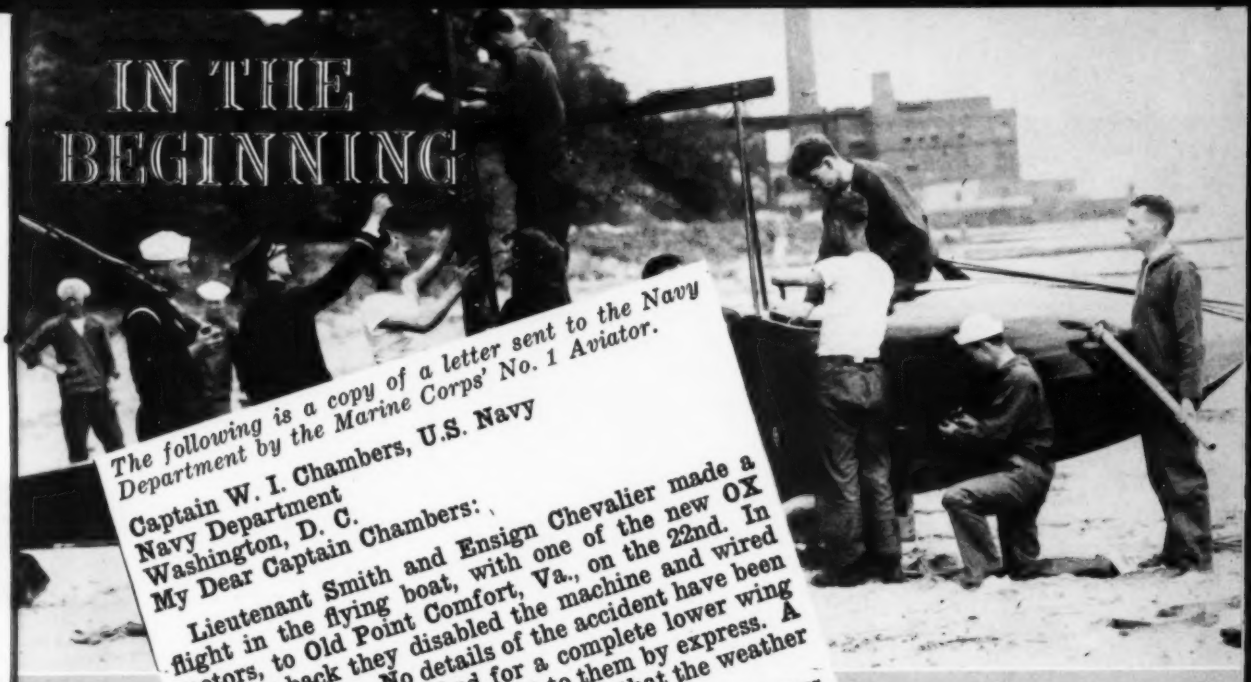
Lighting the Charge—Now that we have stuffed the fuel and air into the jug, we have to light it. The cam that opens the breaker points in the distributor sets off an electrical chain of events ending in high voltage across the plug. For the delivered voltage to be great enough to jump the plug gap, the magneto must be timed so that its potential peak output occurs at the same time the distributor points open. In turn, both magneto and distributor points open. In turn, both magneto and distributor must be set to produce the spark at precisely the right time in relation to piston and valve positions.

Too Early—If the spark occurs too early, the premature combustion results in high pressure during the final portion of the compression stroke. This is particularly true with fast burning mixtures. Leaning out the mixture tends to reduce the harmful effects of early timing. Conversely, advancing the timing gives lean mixtures time to burn and develop power. Advanced spark and lean mixtures go hand in hand. Spark advance without leaning can cause destructive pressures. Leaning without spark advance causes power loss and burning in the exhaust system.

Too Late—A retarded spark ignites the fuel too late in the game to take full advantage of its power potential. The flame is just starting to burn good when the exhaust valve opens and out the stack goes a heck of a lot of power. Combined with a rich mixture, late ignition timing can cause torching. This is particularly true during rapid engine deceleration or when throttles are slammed shut causing, temporarily, a very rich mixture until the carburetor can catch up with the reduced fuel demand.

Timing should be a prime consideration when troubleshooting for low power. Ignition timing *and valve clearance* should be considered together. When running up an engine, take note of response to throttle movement and changes of mixture control position. Tendency to backfire or torch under certain conditions are tip-offs. Low fuel flows can be due to low airflow caused by loose valve clearance. One final word of caution though, when setting valves or ignition timing, beware. Early ignition timing may bring up the power enough to damage combustion chambers. Tight valve clearance can cause valve burning and cam damage. If you have to adjust, *Get It Right!* ●

IN THE BEGINNING



The following is a copy of a letter sent to the Navy Department by the Marine Corps' No. 1 Aviator.

Captain W. I. Chambers, U.S. Navy
Navy Department
Washington, D. C.

My Dear Captain Chambers:

Lieutenant Smith and Ensign Chevalier made a flight in the flying boat, with one of the new OX motors, to Old Point Comfort, Va., on the 22nd. In starting back they disabled the machine and wired for spare parts. No details of the accident have been received, but they asked for a complete lower wing and flippers. These were sent to them by express. A message was received today saying that the weather was too bad to start back.

My machine, as I told you and as Mr. Towers probably told you, is not in my opinion fit for use. I built it from parts of the Burgess F and the Wright B, which are not exactly alike and nothing fitted. I had to cut off and patch up parts and bore additional holes in beams in order to make them fit. The engine bed, made by Burgess, was not exactly square with the front beam, so the engine had to be mounted a little out of true (with reference to the engine bed). I have made over two hundred flights in this machine and recently, in spite of unusual care of myself and men, something seems to vibrate loose or off on a majority of the flights made. One of the propeller shafts is the same one used with the Gyro motor in the old machine. It is the only left-hand shaft here. While the engine runs smoothly, it does not deliver nearly as much power as when it was newer, and even then, it did not have enough power to fly safely in any but smooth weather. It is impossible to climb over a few hundred feet with a passenger. The whole machine has just about served its usefulness and I would like very much to have a new machine of the single propeller type. Lieutenant Arnold, of the Army, after seeing the machine run and examining it, said that none of the Army flyers would go up in it. Will you kindly let me know what the prospects are for my getting a new machine.

Respectfully,

Alfred A. Cunningham
Naval Aviation Camp,
Annapolis, Md.
July 25, 1913

DRIPPING DYNAMITE

THAT old "BUGABOO" of improperly prepared engines leaking fuel and fumes while being airlifted keeps coming up. Since January 1957, 29 incidents involving leaking fuel from so-called properly packed aircraft engines, GPU's and allied equipment have resulted in hazardous in-flight conditions with resulting reports.

The importance of properly preparing aircraft engines, GPU's, motors, tip tanks, carburetors, etc., for air shipment has been stressed time and time again. But there are still a few organizations and individuals who, apparently, have ignored the "word."

Headquarters MATS has spelled out the responsibility for insuring the proper preparation of engines for aerial shipment in accordance with the applicable T.O.'s. Jet engines, for instance, are prepared in accordance with T.O. 2J-1-18, while T.O. 2R-1-11 covers reciprocating engines. Others include T.O. 36-1-5 (Motor Vehicles); T.O. 35-1-4 (Ground Equipment); T.O. 1-1-3 (Integral Fuel Tanks); T.O. 6J14-1-4 (External Fuel Tanks); and T.O. 6R-1-3 (Carburetor and Fuel Pumps).

Briefly, the initial responsibility rests with the shipping agency. Here the requirement exists to indicate on the shipping documents the proper condition for air transportation. However, after cargo has been delivered to the MATS or local traffic officer, it then becomes his responsibility to insure that it is acceptable for shipment by air. Traffic personnel, we realize, are not experts in the field of purging aircraft engines; therefore, acceptance or rejection of the item for aerial shipment will have to depend upon the proof of compliance or certificate of accomplishment of the applicable technical order by the shipping agency. Regardless of the certification, though, a little "extra" service, e.g., habitually checking for signs of leaking, is always in order. If there are any indications of fuel leakage, the transportation officer or his representative is empowered and should not hesitate to refuse the shipment for air transportation. The same is true for the loadmaster and aircraft commander. It hardly seems necessary to note that, if either becomes aware of cargo that constitutes a safety-of-flight hazard, they can promptly refuse the shipment or, if in flight, return the aircraft to its base or the nearest base for off-loading of the hazardous item.

Self-preservation is a primary, inborn instinct. Respect the next man's desire to live by not exposing him, either through neglect or ignorance, to hazardous conditions that just a little more effort and understanding could have prevented.

If only three areas of operation will monitor their responsibilities more carefully, the problem of inflight emergencies of this nature can be whipped:

1. The shipper—if he will adhere strictly to the established T.O. governing the packing of the engine or other fuel-operated equipment.

2. The traffic officer—if he or his representative will establish beyond a doubt, through certification and examination, the safe air-worthiness of the equipment.

3. The crew—if they will refuse to accept questionable cargo.

—*"The MATS Flyer"*

Aerial shipment of fuel-operated equipment requires special preparation.

PREVENT A CRUNCH

"The underlying cause of this accident was complacency. This attitude extended from the ground handling crew involved upward through immediate supervisors, duty officers, division officers and departmental officers. Instructions to preclude such an accident were largely ignored because of the seemingly routine nature of towing aircraft."—*from the accident report.*

The Endorser notes "The only salvageable value from an accident caused by complacency is the experience gained to prevent a recurrence—a very expensive lesson in how *not* to move aircraft."

PREVENT A CRUNCH

Slackened Tiedowns

AN over-the-side loss of an F3H from the flight deck of a carrier underway brought to light several points of interest regarding tiedown procedures.

Following recovery this F3H was spotted on the forward starboard corner of the flight deck.

In anticipation of a rolling deck during a course change the bridge directed delay of respot and that all aircraft be held in place. The Air Boss then directed that 9-point tiedowns be made on all aircraft.

Six minutes later when the ship made a 30-degree course change a moderate roll was encountered, the aircraft broke its tiedowns and slipped over the side.

Investigation revealed that this aircraft had three chain tiedowns installed. Other aircraft in the immediate vicinity had three to six chain tiedowns installed. The ill-fated F3H had in the meantime been refueled. Accident investigators were of the opinion the aircraft may have settled on its oleos after refueling putting slack in the tiedowns.

In the past 15 months, 5 aircraft have been lost due to inadequate securing or handling. A review of procedures and responsibilities appears to be in order.

Spot Marks Help

THE S2F was improperly spotted on the no. 2 elevator in such a manner that insufficient clearance existed. When the elevator was lowered, the starboard wing butt made contact with the edge of the flight deck causing damage to the wing butt and the folded wing panel.

The plane director, concerned with the propeller clearance, did not ascertain that adequate clearance was available for the entire aircraft. Moving the aircraft under conditions of high winds, high sea state, and pitching deck caused the plane director to settle for something less than the ideal spot for the aircraft on the elevator. This compromise of standards contributed directly to the accident.

Recommendations of the Board:

(a) It is recommended that movement of aircraft under adverse conditions be held to an absolute minimum.

(b) It is imperative that clearance be ascertained prior to lowering an elevator. Since there is more than adequate clearance for the S2F on the elevators it is recommended that spotting on the elevators be done so that maximum clearance be realized rather than permit an elevator to be lowered with minimum clearance. In order to determine that safety clearance exists, it is recommended that spots be painted on the elevator for the aircraft wheels and that it be required that aircraft be spotted on the elevator in such a manner that wheels are on the marked spots.

Vehicle Safety

A CONSIDERABLE number of our accidents have been occurring aboard our carriers. In our squadron and aboard ship we have a tendency to consider the flight deck a responsibility of the ship's company, and leave it to those responsible for the job. Flight deck handling crews do have the responsibility but you and your squadron have the accidents. The more we think "could this get me in trouble," the better off we will be. Get this across to our personnel. This applies chiefly in aviation safety and also in our drive-safe program. We are killing more of our personnel with automobiles than in aircraft. We must be safety conscious in our vehicles, automobiles, NC-5's, etc. We cannot afford to lose the equipment. We are cracking up more aircraft than we are getting in replacement. We must cut down material damage if we want to stay in business. It behooves us all to get safety conscious and reduce mistakes.—*ComFAirQuonset*

Water or Oil Pumped Nitrogen O. K.

REPORTS indicate some activities are reluctant to use nitrogen other than specified by A4D Maintenance Instructions NavAer 01-40AVA-2 Interim Revision 6 of 17 Oct 60 following completion of ASC 169C. The change reworks the canopy bungee for use with nitrogen. Nitrogen specified by HMI is water-pumped during manufacture while some carriers are only capable of manufacturing nitrogen by the oil-pumped method, MIL-N-6011 Grade B type I.

In either case manufactured end products conforming to the foregoing specification are acceptable. The next revision to the HMI will include this information.

How Good *IS* Your Quality Control?

AT THE F8U Aviation Safety Officers conference, attention of the attendees was focused on the rather alarming fact that our quality control is not doing the job that it is supposed to do. While this discovery was made before any accident had happened, it did point up the mistakes being made, which could possibly result in the loss of the pilots life as well as the aircraft.

Examples of these errors in maintenance work which were not discovered by the inspectors and were found when the aircraft was put into the mod program were quite varied. They ranged from the failure to complete the work by securing connections with the required lock wire or cotter pins to actual mis-installation of the part. In some instances the improper installation required much ingenuity on the part of the mechanic in order to fit it in. The sad part of these mistakes was that they involved flight control connections which could have caused complete loss of control. This information was brought to the attention of all F8U ASOs and is presented for the action of all Safety Officers in all units.

This problem is not localized. It is insidious in nature in that after the required work is completed and inspected, it is closed up and the pilot is required to depend on the professional ability of the mechanic and the inspector to ensure that the aircraft is actually in an up status. The Quality Control Inspector must be experienced and so reliable that his OK of the job performed can be accepted as final. However as in every job, the man can get so familiar with the work that he fails to note a change in the HMI and uses his past experience as the criteria rather than accepted and approved publications. One way to check on the efficiency of these inspectors is to get the Maintenance Officer to spot check for any possible errors in procedure or laxness in checking the work for completeness.

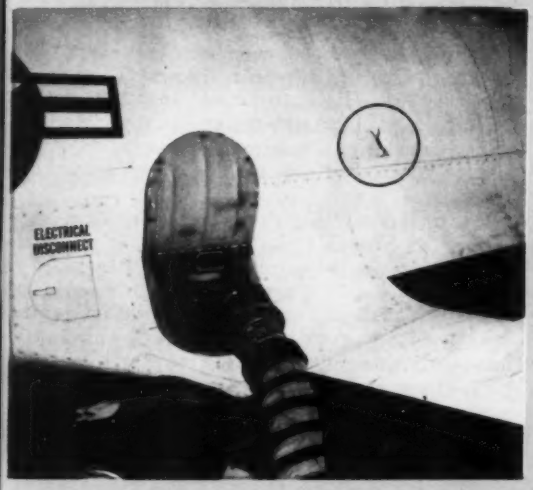
—ComNavAirPac

Whip-Lashed

AN airstart unit hooked to a TV-2 in preparation for starting. When ram air was applied for starting the coupling parted from the aircraft. Before the air could be shut down the air hose struck the side of the fuselage as is evidenced by photo, lower left.

The fix. Web harness strap with snap properly secured will limit whipping of hose, minimizing hazard to aircraft/personnel, photo lower right.

—VA 23



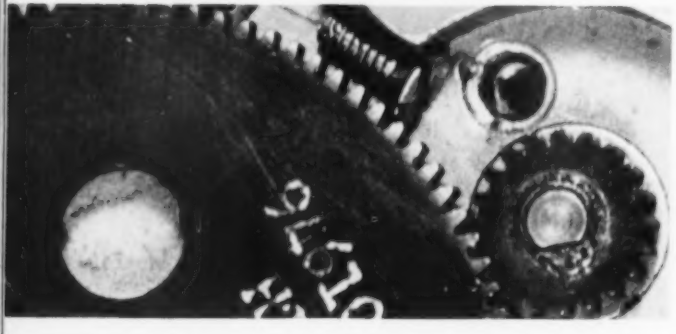
FOD

The Good Housekeeping Seal of *Dis*Approval

PURE jet engines and, to a lesser extent, turboprops are funny creatures. They will ingest anything from clothing and tools to human beings. This voracious appetite isn't good for the tummies of these engines. They react violently and the Foreign Object Damage (FOD) can be expensive.

This brings up the matter of *housekeeping*. Airports cannot permit rocks, tools, cotterpins, etc., to lie around the aprons as before. Mechanics will have to be careful that they do not leave tools around or that they have loose objects in their pockets which could fall out. Another complication surrounding this problem is that damage can be done immediately or can occur over a long period of time. You might well ask whether the latter would be called an accident or not. For instance, take a dusty airport with small particles of either dirt or stone. Operation off this airport of these engines. They react violently and Foreign Object Damage (FOD) can be expensive, very expensive.

LOCKED RUDDER—After becoming airborne and at speeds greater than 150 knots, the FJ-4 pilot's rudder locked. At speeds less than 150 knots, he was able to regain control of the rudder. The pilot burned down to landing weight and executed a normal landing. The cause of this occurrence is the improper retention of "staking" of a screw within the auto-pilot, motor and drive Assembly Servo. A small screw backed out and caught thereby locking servo unit (photo below.)—Tighter quality control and inspection procedures were recommended.



Foreign Objects Objectionable

. . . Do you have any idea of the damage that can be done to a jet engine by foreign objects such as rags and soft drink cans? You DO know that jets are about the strongest vacuum cleaners in the Navy . . . a jet can pick-up more junk from the deck than anything that you have ever seen. Jets have been known to draw men in through the intakes on several occasions, and they gobble up smaller objects almost as easily as air at times.

Pity the poor jet pilot who gets a rag into his engine. He is sitting on a powder keg. While he is just taxiing along he may be turning up about 6000 rpm, and when an engine comes apart at that speed it leaves pieces all over the local terrain. A piece of turbine blade from a jet engine is a bullet . . . with all the velocity and size of a big one at that.

Nuts, Bolts and Object Damage

"Never fail to account for each nut, bolt, washer," declares a recent General Electric *Jet Service News*, adding practical advice on how to avoid foreign-object jet-engine damage. Foreign-object damage is the largest single cause of premature removal of gas turbine engines from aircraft.

It's understandable that the ability of a small bolt or an airman's cap to damage or snuff the life out of a jet power plane when it's ingested by the engine is a fact not easily comprehended immediately. But, those working around jet engines cannot afford to forget the damage possibilities inherently present. Certainly, supervisors should be held responsible for maintenance crews' alertness.

The GE publication relates that at one base rewriting SOPs resulted in a reduction of 63 per-

cent in damage. The item stresses the value of inventorying hand tools when completing a job and never *assuming* where one of them is. Identification badges, pen, pencils and coins can damage the engines too, the article states, indicating another reason for each person to be careful. Other points made include being sure inlets of replacement engines are clear when installed.—*AF Flight Safety Research*

Isolated Case No. 1998

A 120-hour check had just been completed on a T-34B and a mech left his torque wrench on top of the starboard cylinder bank. The cowling was secured and a run-up commenced. The wrench worked out through the open nose section and the prop flicked it to the left where another T-34 was parked in the adjacent parallel spot. The wrench took two skips gouging out small pieces of concrete and slammed into the second T-34 just below the front windshield.

The accident board stated: "This occurrence must be considered an 'isolated case.' The men involved were both senior and very competent petty officers. The point for emphasis is that lapses can develop in the best, and it is an all hands job to guard against it."

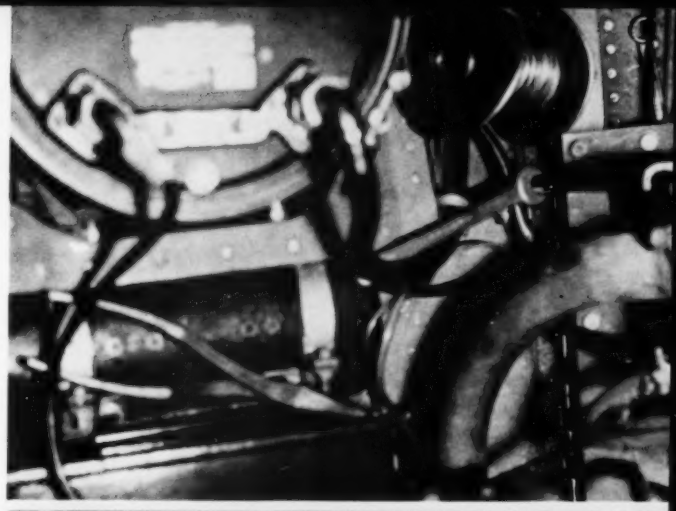
For the record, and NASC records prove it, there is no such thing as an isolated case as applied to aviation accidents. If it happened once—it can, and always has, happened again.

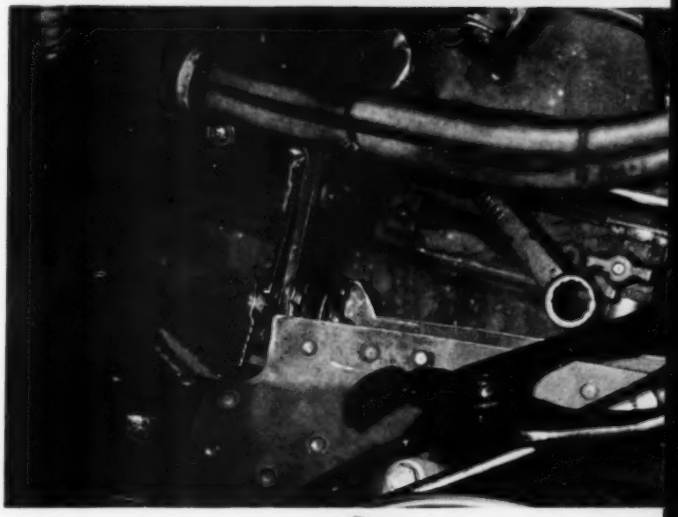
Neither Small Tools Nor Engines Will Withstand FOD Abuse

A FIFTY-CENT 25/32 inch end wrench left in the intake caused the destruction of a jet engine. The last intake duct maintenance had been carried out three days before the accident. Apparently the wrench had been overlooked when the work was finished and signed off. Then it slid into the oil cooler duct and lodged there until it was ingested in flight.

Some maintenance organizations include a red cross entry on the work sheet each time the duct is entered. This red entry notes the number of tools used in the duct and the supervisor who signs off the entry verifies that all of the tools have been removed.

Supervision and inspection are good and necessary but the responsibility for this type of engine damage will always rest directly upon the mechanic involved.—*Flight Safety Foundation*





POTENTIAL KILLERS ALL — Hardware found in jet airframe following maintenance re-emphasizes need for thorough inspections.

APPROACH readers often ask as to the origin of Murphy's Law.* Others have reported situations which are not in accord with the concept of the Law and still others have attempted to "barristerize" the law into a variety of meanings. To set the record straight, here's the ungarbled word on

MURPHY'S LAW

THE law was first cast by Joe Chase, Editor of the Flight Safety Foundation's "Mechanics Bulletin" early in 1955. It grew out of the precept developed and published by the Foundation in its Design Notes that "Procedures for adequate maintenance and operating practices established by designers should be consistent with average human effort, ability and attitude."

The law as coined reads:

""If an aircraft part can be installed incorrectly, someone will install it that way."*

Unfortunately, these clever words lend themselves to many variations and interpretations; consequently some people use the label Murphy's Law for things far beyond the original intent. The concept behind Murphy's Law is directly related to the original design of a piece of hardware. The idea is that if the drawing board types design a piece of equipment in such a manner that it may be installed in a way other than intended, some dear soul will surely put it on the wrong way.

When we start modifying the law to include errors not related to design characteristics, *we destroy the effectiveness* of the law. The proper cause of a mistake doesn't get the proper attention and we tend to say, "Oh well, you must expect an occasional blunder like that. After all there is a Murphy in every crowd." Once we become conditioned to this outlook, we cease asking the all-important "why?" and the system for possible correction is by passed and the pattern for recurrence is established.

Ever since the first aviation mechanic crossed a pair of flight control cables, the universality of Murphy's Law has been continually demonstrated. Rest assured this type Murphy is not restricted to one aircraft or manufacturer. Aviation accident records, both civil and military show case after case which have been positively identified as reversed control rigging. These cases range from jets, helicopters, and single-engine fighters thru multi-engined transports and bombers. The errors have been made at operating bases, overhaul activities and during aircraft manufacturing. Murphy's Law extends to all systems. The logical way of hooking up control or electrical cables, pitot-static plumbing, hydraulic lines or fuel and oil lines, is often the wrong way. The insidious characteristics of Murphy's Law must be brought into focus when considering the billions of manhours spent each year in the maintenance and repair of aircraft.

The Naval Aviation Safety Center and the Editors of APPROACH feel that in Murphy's Law we have a simple gimmick to alert mechanics and designers to booby traps with the ultimate objective of establishing fixes and to prevent such designs from reappearing in new aircraft.

For safety's sake please keep Murphy in his proper place and stick to the original law.

HO4S-3 MURPHY

WHEN installing a new intermediate gear box assembly and tail rotor drive shaft assembly on an HO4S-3 aircraft, it was noted that the male spline assembly of the drive shaft did not completely extend into the female spline coupling of the intermediate gear box. It was possible, however, to complete the installation.

A thorough investigation by maintenance personnel revealed that the bracket assemblies (item 26) had been installed backwards at O&R. The left-hand bracket assembly was installed on the right side and the right-hand bracket assembly on the left side. This incorrect installation of the bracket assemblies permitted the gear box to be moved aft approximately 1⅛", thus accounting for the improper seating of the male spline assembly into the female spline coupling. The bracket assemblies were taken off and reversed into the proper position and proper seating of the male splined assembly into the female splined coupling was accomplished.

The left-hand and right-hand bracket assembly position on the gear box is indexed by two identical locating pins and two bolt holes making incorrect installation possible by reversing the brackets.

It is recommended that either the left or right-hand bracket position be indexed by three locating pins vice two pins for the remaining bracket, *—Contributed by CDR E. L. Hutcheson, Aviation Safety Officer, HT-8* ●

CLIPBOARD

Wolf Cry

A MEMBER of this command in an HUS-1 enroute from ALF, El Centro to MCAF Santa Ana was diverted from his flight plan and subjected to a hazardous landing at 116° 37′ west—33° 27′ north by unidentified personnel dressed in summer flight suits.

The pilot's attention was attracted by a Mark 3 type signal mirror and hand signals causing him to believe an emergency existed.

The area was mountainous and extremely rough, and with great difficulty the pilot landed in close proximity to the personnel who had signaled subjecting his crew and aircraft to a hazardous landing.

Upon landing, the pilot found that no emergency existed and that the personnel who were responsible for diverting the aircraft without cause or authority were members of a military survival course and asked only for water.—*Contributed by MAG-36*

Landing Gear Stresses—Easy Does It

LANDING gear service life continues to improve. In order to help maintain this favorable trend, you are again reminded to:

—Avoid sharp turns when taxiing—to the maximum extent possible.

—Avoid turning with the inside gear braked and power applied to opposite engines.

—When possible, let the airplane roll straight forward several feet prior to turning nose wheel on departure, and also prior to parking. This technique will also make for a smoother operation and minimize use of power during initial or final maneuvering.

One other point—tight turns at relatively fast taxi speeds can peel tires off the rim—particularly if tire pressure is low.—*A.A. Flight Deck*

Changing Instructions During Takeoff—A Potential Accident Cause

FREEDOM of the pilot from distracting or vertigo-inducing maneuvers during the all-important interval between takeoff and flight altitude can very well mean the difference between a successful or abortive flight. Many low-altitude accidents from undetermined causes have followed radio frequency or IFF mode changes. Alerting pilots of such changes when they are fully engrossed with cockpit duties—especially fighter-craft pilots who do not have an assistant crewmember to accomplish or assist at such duties—can be disastrous.

An FAA modification of the United States Standard Manual of Radar Air Traffic Control Procedures (OpNav 3722.17A/AFM 55-10), now being distributed, is of special interest to the controller. It directs him to bear in mind that the pilot is preoccupied by cockpit duties immediately after takeoff and to delay "contact departure control, (Frequency) instructions until the departing aircraft is at least one-half mile beyond the departure end of the runway . . ."

Altitudes under 1000 feet and any attitude which requires constant attention to flight instruments or terrain for proper aircraft control are considered critical. When change instructions are received during critical altitude or attitude, the pilot should not record them until a safe altitude is reached or the aircraft is in a stable position. — *USAF "TIG Brief"*

Live Missiles Aboard Aircraft

WHENEVER aircraft arrive and expect to land at NAS Alameda with live missiles aboard, pilots should notify the tower prior to landing, that they are carrying live missiles and request dearming crew. This information will then be relayed to the missile dearming crew who will be prepared to service the aircraft without delay prior to taxiing back to the line.—*NAS Alameda "Newsletter"*

"The experience of others is the cheapest experience we buy."—Anon

NATOPS

Soon each naval aviator will be receiving an annual standardization check in each aircraft which he is currently flying.

For years, those connected with aviation have realized that there must be a standardization of operating procedures. The effort to publish procedures resulted in the NWP series and the Flight Manuals. The areas not covered by these pubs still leave much room for further standardization. Aircraft accidents continue to occur due to lack of standard practice.

Out of this need grew the Naval Air Training and Operating Procedures Standardization program called NATOPS recently detailed in OpNav Instruction 3510.9. This standardization program is planned to aid the Commanding Officer in increasing his unit's combat potential without reducing his command prestige or responsibility. It is a positive approach to effectively reducing aircraft accidents.

Standardization based on professional knowledge and experience provides the framework for development of valid and accepted procedures. Procedures will be kept current by providing quick reaction to suggestions from individual users. Their recommendations for constructive changes in established procedures will be on a continuing basis. NATOPS personnel will encourage units to use initiative in formulating new or better use of existing weapons systems.

NATOPS manuals will eventually be issued on each model of aircraft flown by the Navy. The manual will govern operating procedures not covered in the Flight Manual or NWPs. Compliance with the manuals will be mandatory because they will have the status of OpNav directives.

Two of the billets created by the program will enhance its effectiveness. A standardization instructor will be a member of each aviation unit. He will be a highly qualified officer or crewmember in a specific model aircraft. A standardization evaluator for each model aircraft will be assigned to the organization of each type command, training command and shore establishment. He will move around to various units giving checks to their instructors and to other pilots at random.

Old-timers may feel that this will stifle individual thinking, but the intent of the OpNav Instruction is to standardize only those procedures which lend themselves to standardization. It is not an attempt to make everybody do everything by the numbers but to achieve a uniformly professional approach to all phases of naval aviation.

Through the NATOPS system it is entirely possible that in our 50th year we are entering a new frontier of improved combat readiness and greater aviation safety. But the success of this or any other program to increase our professional ability ultimately depends on each of us. ●

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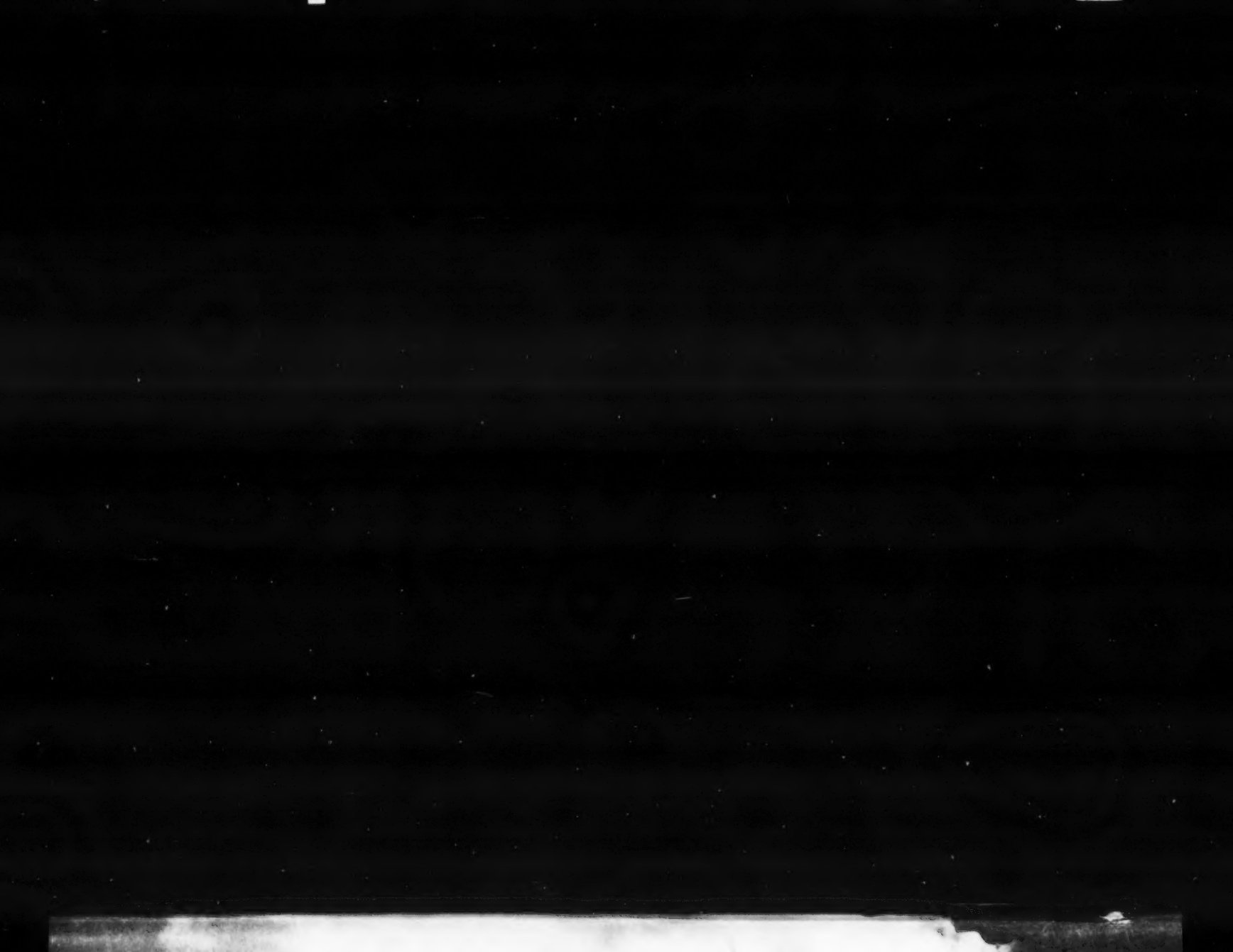
NATOPS — A New Frontier

OpNav sets up the machinery bringing standardization to naval aviation

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